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TYPI^{CAL} ELM^S
and other
TREES OF
MASSACHUSETTS

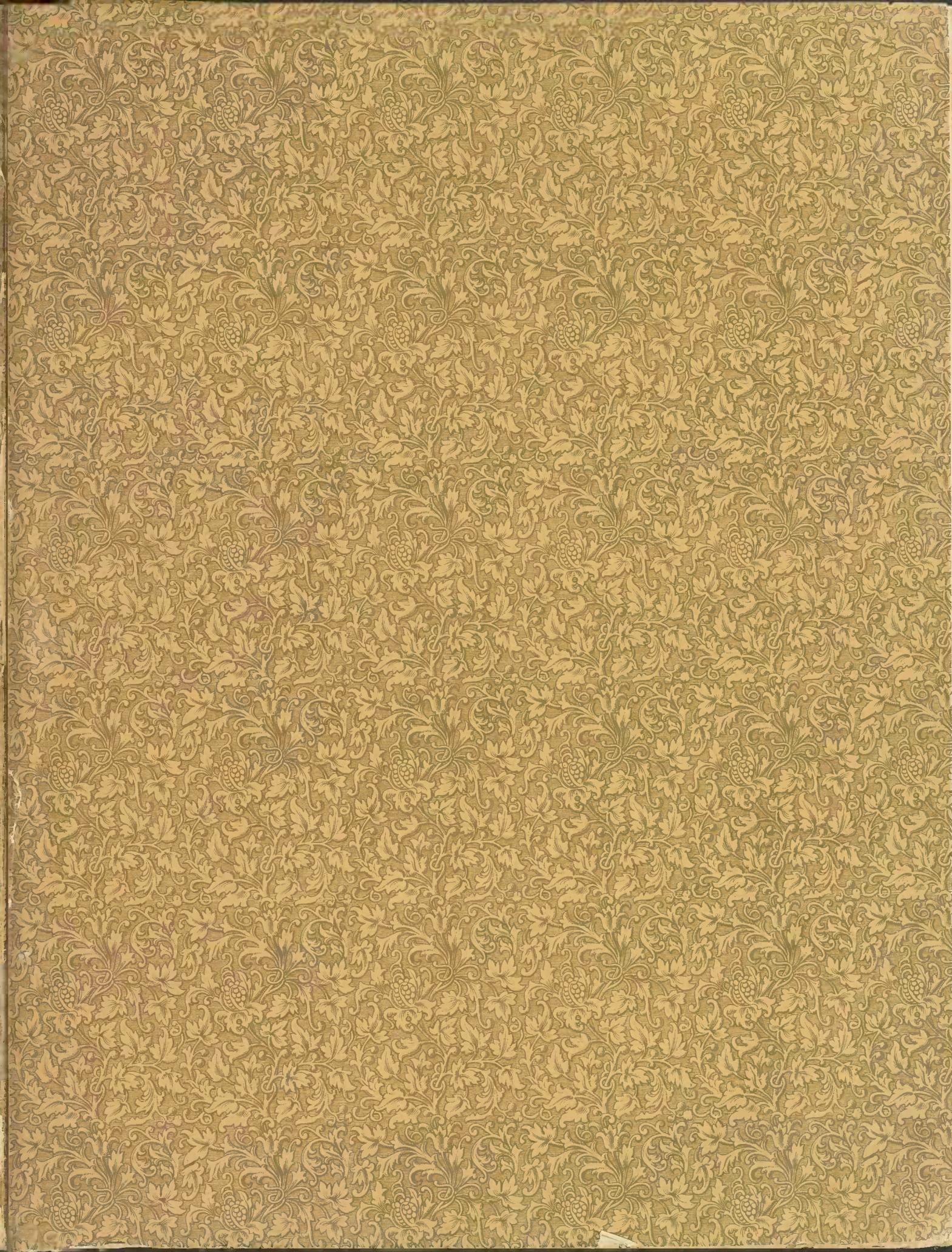
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To
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Augustus Hemansway.



TYPICAL ELMS

AND

OTHER TREES OF MASSACHUSETTS.

*I care not how men trace their ancestry,
To ape or Adam : let them please their whim ;
But I in June am midway to believe
A tree among my far progenitors.
Such sympathy is mine with all the race,
Such mutual recognition vaguely sweet
There is between us,—surely there are times
When they consent to own me of their kin,
And condescend to me, and call me cousin.*

LOWELL.

Augustus Hemmings.

TYPICAL ELMS

AND

OTHER TREES OF MASSACHUSETTS.

Introductory Chapter

BY

OLIVER WENDELL HOLMES.

Descriptive Text

BY LORIN L. DAME.

Plates

BY HENRY BROOKS,

REPRODUCED BY THE PHOTOGELATINE PROCESS.

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INTRODUCTION.

By OLIVER WENDELL HOLMES.

WHEN my young friend Mr. HENRY BROOKS first mentioned his purpose of taking the portraits of some of our New England trees, I was pleasantly reminded of a project of my own presented to the public thirty years ago in the "Atlantic Monthly," and to be found in a book, still to be met with at the antiquarian book-stores, known as "The Autocrat of the Breakfast-Table."

The proposal was in this form:—

"I wish somebody would get up the following work:—

"SYLVA NOVANGLICA,

"Photographs of New England Elms and other Trees taken upon the same Scale of Magnitude. With Letter Press Descriptions by a Distinguished Literary Gentleman. Boston, —, — & Co. 185—.

"The same camera should be used, and so far as possible, at a fixed distance. . . . If my plan were carried out, and another series of a dozen English trees photographed on the same scale, the effect would be charming." (The comparison would be interesting was what I should have said.)

Some time after this, Dr. R. U. Piper published a number of portraits of fine New England trees, but not drawn on a fixed scale of magnitude. I found his work attractive, but still waited in the hope that my suggestion would sooner or later be more exactly carried out. I have had to wait for a whole generation. Since 1858, when my imaginary prospectus was offered to the public, what changes have taken place in the generation of trees then on the stage! The span-long saplings which I planted with my own hands on the bare hillside in Berkshire where I built a modest summer residence,—"mansion," my country neighbors called it,—now tower high over its tallest chimney. The grand old patriarchs, those mighty elms, before which I often, when alone, and without affectation, bowed my head, and could without shame have knelt and kissed the turf at their feet,—where are they now?

Where is the "Great Elm" which looked upon Shawmut before Blackstone rode his bull through the woods where is now our Boston Common? Where is that huge "Johnston Elm," near Providence, which in the days of my early manhood spread its gigantic branches in full vigor, and offered its vast trunk to my measuring tape without feeling a quiver in its most nicely poised leaf? Where is the colossal Springfield elm, the only one I have ever found which would have dared to challenge the great English elm I saw at Oxford? All gone, and many another wrecked or prostrate or vanished that I have looked upon in its glory.

The truth is the magnificent American elm is a fragile and not a very long-lived tree; and from what I heard in a late visit to England, the English elm on its own soil is not much better. The tenants of the college quadrangles lie awake in the great storms listening to the crash of the falling branches of the tall elms that line the walks and river margins. As for our own native elms, I doubt if the most aged among them would much more than cover the lives of three old men, starting from their cradles with the second and third as their predecessors disappeared. But a life of between two and three centuries seems a long one in a new country like ours, and "the old elm" is often the most ancient monument of a New England village. I myself am fortunate enough to remember a number of old monumental trees in my native town of Cambridge, Massachusetts. When I first rolled my infant eyes toward the glare of the western sky as it looked through the windows of my birth chamber, four green masses, each of them "a forest waving on a single stem," as I put it in verse long afterward, printed themselves on my retina through my blinking eyelids. One was an old patriarch which fell, I think, either in the great September gale of 1815, or at about that time, but I remember its stump with a certain reverence. On the opposite side of the Common stood the "Washington Elm," now senile, and soon to be father and godfather of innumerable canes, crosses, picture-frames, and other relics. North of that stood a fair outspread tree, which from its form I always called the "coral fan," and beyond that another, handsome, but inconspicuous. There was another noble elm, long since vanished, which overarched the highway that leads west from Harvard Square to Mount Auburn. These trees entered into my young life as truly as the milk that made its blood. Why should I not love their memory and linger over it?

We have many other fine trees,—oaks, pines, lindens, beeches, horse-chestnuts, willows,—individuals of which deserve special biographies. There is an oak, a mile from where I am now sitting, at Beverly Farms, Massachusetts, to which I always lift my hat. What a future that robust, full-blooded, broad-armed, symmetrical young

giant has before it if the human ephemera which carries an axe in its grasp does not sacrilegiously invade its life! There are horse-chestnuts in Salem and other towns of Essex county that are always noble to look upon, and, with their chandeliers aflame, are resplendent as illuminated pagodas. I found one at Rockport, just beyond Gloucester, Massachusetts, which I did not remember having seen equalled. There has been growing up under the eyes of our young people a willow of such amplitude, grace, and beauty that it is worth a pilgrimage to Boston to look upon it. It is situated very near the eastern end of the bridge over the pond in the Public Garden. Its trunk is not of exceptional size, but its masses of drooping foliage are a truly magnificent overflow of abounding life. I remember having pointed out to me in the forest of Fontainebleau a very beautiful tree known as *le bouquet du roi*. May we not call this tree the Queen of the Willows? What crowned lady ever had a *chevelure* like that of her Majesty of our Public Garden? Even a fine apple-tree has its beauty. Not soaring, not picturesque, except in its old age, when its sharp elbows assert themselves with the emphasis belonging to those of an ancient vestal, it has a transfiguration at Whitsuntide, when it stands arrayed in its white and pink bridal favors, and wears its jewels in October with the pomp of a full-blown duchess. I have some large apple-trees around me, the fruit of which will soon be tapping my chamber windows. Fine trees they are, and I am grateful to them and even proud of two of them,—the “green tent” and the “seven-branched candlestick;” but they are lacking in “distinction,” as Matthew Arnold would say, and are fruit-pedlers, while the elm deals only with the sunbeams.

It is a blessed sign of advancing civilization that our people east and west are beginning to plant forest-trees. When trees are spoken of under the fatal name of timber, the settler may expect soon to find himself in a graveyard of blackened stumps. The forest-trees will be treated as if infected with the taint of original sin, and the whole native growth must be born again in the shape of food-bearing vegetable life. Now has come the need of the beautiful, and “Arbor Day” takes its place with the Fourth of July and Decoration Day.

I hope the possessors of these portraits of some of our forest-trees will pardon this prelude, which is almost a rhapsody and found it hard not to break out in dithyrambic apostrophes. My young friend consulted me early about his as yet immature project. I gave it my hearty approval, and made some suggestions which he told me he should adopt. The most important of these relates to furnishing the means of comparison of every individual tree with its rivals in this and in other countries. My idea in the fanciful prospectus was to take all the trees with the same or an exactly similar

camera, at the same distance; but this is often impracticable. I find that a human figure is sometimes introduced in tree-portraits, to afford means of comparison. But this is inexact, unless we know the precise height of the individual. Oftentimes no standard whatever is furnished, and we cannot say whether a tree is fifteen or twenty-five feet in circumference. Measurements are often reported which are taken around the spread of the roots or that of the main branches, instead of in the narrowest part between them. Mr. Brooks has adopted a suggestion of mine which meets the difficulty.

The proper rule for measuring the girth of the trunk of an elm is the same as that for taking the measure of a lady's girdle. I have found that as a general rule about five feet above the ground is the place of election. Fourteen feet in circumference is a large girth; from sixteen to eighteen a very large one; twenty is exceptional; twenty-two and a few inches the maximum I have found, with the single exception of the great Springfield elm before referred to, now gone, which fifty years ago measured more than twenty-five feet of clean girth. Something more than a hundred and twenty feet from bough-end to bough-end is the greatest extent I remember. I do not give these numbers very minutely, as they may be found in Mr. George B. Emerson's "Report on the Trees and Shrubs growing naturally in the Forests of Massachusetts," where many of my measurements are recorded.

The various forms affected by the elm may be classed as follows,—

The round, equally developed, sturdy, apple-tree form, noble, but less picturesque than some of the others.

The weeping-willow form, eminently beautiful when the foliage is rich and heavy, as it often is.

The plume-like, or, as I should rather say, the champagne-glass figure,—tall, straight stem, with upward-stretching, gradually diverging branches and everted border, something like the bell of a morning-glory.

The parasol or umbrella form, reminding us of the stone pine, is rarer than any of these, and may be largely due to continued pruning.

But the individual peculiarities are endless. The more our elms are studied, the more we recognize that it is the favorite of Nature above all other ornamental trees in our New England flora.

P R E F A C E.

WHO that loves trees does not remember how charmingly the Autocrat talked of his big friends; how proud he was of their thews and sinews; how far he would go to feel the biceps of a goodly oak or elm; and how relentlessly he reduced ambitious pretensions by the chilling application of his truthful tape? A wide circle of readers share his appreciation of trees. The finest minds in all ages have admired them, and when the world was young they worshipped them as the abode of gods. Nothing in nature is finer than a tree. Napoleon deflected his great military road across the Simplon to save an ancient cypress; we cut them down to straighten a country street.

Many of the arboreal worthies of colonial days—Penn's Treaty Elm, the Charter Oak, the Jane M'Crea Pine, Wayne's Black Walnut, and their compeers—have long since passed away. Some of the noblest of them all are known to us only by name or vague description; others, less fortunate, have had their reputations wrecked by the infamous woodcuts in the school-books of our fathers. Other historic trees, like the Washington Elm at Cambridge, linger on in their dotage; while a few, with diminished front, still maintain somewhat of their pristine vigor. Noble elms, too, planted prior to the Revolution, standing in front of old gambrel-roofed houses, are scattered here and there, solicitously cared for, and pointed out to visitors with a becoming pride. Often they mark anniversaries, most frequently of birth or marriage, and have become with the lengthening years a priceless family inheritance.

Another class of trees is of special interest. The axe of the woodman has done its work so well that few are aware what stalwart proportions our native trees attain when growing under favorable conditions and allowed to live out their natural lease of life. Occasional oaks, chestnuts, sycamores, and maples, of heroic proportions, survive to show the possibilities of tree-life in bleak New England, and to give pregnant hints to the landscape-gardener who can afford to wait a century for justification.

The call of the Autocrat, in the August number of the "Atlantic," 1858, for a biography of distinguished trees, with photographs upon a fixed scale, expressed so general a desire that it is a wonder the work has not been previously undertaken. From that date, the historian of this volume has looked over the announcements of publishers for the required prospectus; he has had an eye also on the big trees, but with no idea of turning biographer. Within a radius of ten or a dozen miles from his residence he has struck up a close acquaintance with every tree of note, his pleasures enlarging from year to year with the ever-widening circle of his forest friends. He has felt the glow of discovery when, in solitary walks, he has chanced upon some stately tree, unheralded by fame, lifting its serene head in proud obscurity. The richest field for exploration has been along the Connecticut River Valley, where the deep alluvial soil sustains a race of giants. Throughout the river towns, back to the spurs of the adjacent hills, there is a constant feast of surprises; trees of every kind, growing naturally or planted generations ago, reach their highest development. On the interval lands in the valley of the Nashua and its tributaries, also, there are elms and buttonwoods whom it is an honor to know.

There is no means of determining what was the size of many famous trees; the measurements, when given at all, are mostly of no value. The Genesee Oak, for instance, which was swept down the Genesee River into Lake Ontario by a flood in 1857, was 26 feet 9 inches in circumference; but no intimation is given at what point the tape was applied. If over the swell of the roots, and, as is probable, drawn out far enough to take in the extreme projection of the buttresses, the figures are misleading, and furnish no clew to the actual size of the trunk. The historian has measured all the great trees he has fallen in with, at a uniform height of five feet from the ground, wherever the configuration admits. These measurements have been repeated at the same height from year to year, showing the annual increase in wet seasons and dry seasons, in young and old trees, and, in case of elms and of apple-trees, in seasons when the canker-worm has stripped off the leaves in early spring. The height has likewise been taken,—at first by the "shadow-method," which worked best on level ground and within an hour or two of noon, but for various reasons was often impracticable; afterwards by a simple comparison of right triangles: the chief liability to error lies in the impossibility in some cases of seeing the real top of the tree.

In the summer of 1886 the historian fell in with the photographer, and the scheme outlined by the Autocrat began to assume a vague consistency. The historian, after the fashion of his craft, set himself about the collection of facts.

Circulars were despatched to different sections of Massachusetts, and a correspondence, formidable in its proportions, opened with persons interested in the subject. Some of the postmasters to whom the circulars were sent, with scrupulous honesty returned through the mail the addressed and stamped envelope enclosed, without comment; the result as a whole, however, has been very gratifying. Out of two hundred and fifty letters of inquiry, more than one hundred and fifty drew out responses, from which much valuable information has been extracted. From these letters, and from many personal interviews, it is evident that there are far more noteworthy trees in Massachusetts than had been supposed, and that, with few exceptions, there is a strong local pride which tends to their preservation. They are so scattered, it often happens that the elm in one town doesn't know his neighbor, two or three towns remote; hence, in consequence of insularity and association with inferiors, overrates his comparative importance. There are, if reports may be trusted, certainly seven elms, each of which is the largest in the State, if not in the States. The "cold tape" must decide their physical proportions, but it cannot measure their effectiveness in the landscape. With regard to many of them, very little appears to be known; as a consequence, the accompanying text will often be meagre, as it seems scarcely desirable to pad the essentials with an extended description of local surroundings. There is nothing more elusive than the age of trees. There is no Family Bible in which the date of their birth is recorded. While they are small, no one cares to ask their age; and when they have grown to greatness, there is no one alive who remembers it. The imagination revels in round numbers, and when stopped by no barriers in its backward flight, makes nothing of an additional century or two. All statements of great age must be sifted with care. The owner of an ancient tree can scarcely put far enough behind him the inclination to special pleading. The testimony of his father when an old man that *his* father when an old man said that the ancestral elm was as large, or nearly as large, when he was a boy as at the time he was speaking, is too vague to furnish a basis for anything more conclusive than guess-work. More satisfactory, but still incomplete, is the evidence afforded by the language of old conveyances, repeated in successive transfers for more than two hundred years; a lot, for instance, bounded by a line running northerly "to the great oak." This language, used in 1686, of a white oak, would safely imply more than a century of previous life. Absolute certainty has been reached in a few cases, by consulting old journals in which the date of setting out memorial trees was fortunately entered. For the most

part, it is manifestly impossible to be exact; the historian has given the lowest age consistent with the facts ascertained; and where the qualifying "about" is used, to the best of his knowledge and belief the error is insignificant.

While the historian was gathering descriptive and biographical material, the photographer took up his part of the work. The subjects were in themselves an inspiration,—trees of noble presence growing in the open, either at their highest point of development, or even in their ruins betokening what they once had been. As a photographic subject, however, the large tree in full leaf presents many difficulties, and it is frequently impossible to obtain a result wherein the relative values are preserved. The foliage of the lateral and overhanging branches was often so dense that it was found necessary to visit certain trees shortly after sunrise, the only time when the required light was diffused about the trunk. The amateur soon acquires a profound respect for the manual skill, scientific attainments, and artistic sense which combine to make the successful photographer of trees. The numerous difficulties which beset the tyro—amusing enough the enumeration of them would be to the professional—are soon overcome by experience; but the obstacles attending the photographing of each tree upon a fixed scale, at a uniform distance, no experience can wholly remove. It would be a simple task indeed if the trees grew isolated, upon level ground, where the camera could be set down at the distance of a hundred feet, offering a good view from every direction; but, unfortunately, in many instances it was found impossible to place the instrument at the specified distance without the intervention of objects which partially obscured the subject or rendered it of secondary importance; and the "wider angle" brought in too many collateral features. In some instances a tree very large of its kind, like the Reading Sassafras, was dwarfed to insignificance; and in others, elms great even among the great ones of the tree-world could not cramp their wide-reaching limbs within the compass of the prescribed plate; nor could the pine, the most aspiring tree within our limits, brook the abatement of its royal height.

Notwithstanding the range of subjects was restricted, so many negatives had been secured by the fall of 1887 that the photographer, presuming upon the paternal interest of the Autocrat in the execution of his own scheme, submitted his work for criticism and advice. But Dr. Holmes, while cordially approving the undertaking, insisted on a fixed scale of measurement, and suggested that two white wands, each five feet in length, and put together in the form of a T, should be set up against each tree and photographed with it. The artist would then be

free to make the best possible *picture*, allowing the wand to satisfy technical requirements by effectually preventing all misrepresentations common in photography and giving emphasis to a line of accurately defined measurement. This invention is indeed a rod of reason; and although it was at first styled a "scientific disfigurement," all original dissenters have acknowledged the propriety of the innovation. As a sequence of its adoption, however, all the negatives secured with so much effort became worthless, and it was necessary to go over the same ground under the new conditions. This double labor was not without its compensations. The peculiarities of the trees previously visited being well understood, it was easy to revisit them at the proper hour, securing better results with less expenditure of time.

Work under this plan was begun in July and August of 1888,—a season of high winds and cloudy skies. On the appearance of fair weather it was incumbent to start at once, perhaps to go fifty miles, only to be disappointed by a sudden climatic change. The photographer has stood for a quarter of an hour with his hand upon the shutter, waiting for a lull in the wind; he has seriously considered the advisability of pitching a tent near by some of his subjects, in order to avail himself of fugitive slatches. A similar experience fell to his lot in the summer of 1889. The vexations arising from New England weather in its most aggravated form, and the inevitable *impedimenta*, have been the potent agencies through whose operation the small square box, that was at first the photographer's constant companion, has, by a kind of evolution, expanded to a long wagon with waterproof top and sides, ample dark room, and sleeping accommodations.

Aside from the immediate, visible results of photographic work, patience and close application bring, in the end, their own rewards. The sense of perception is rendered very acute, and the beauty of form, hitherto disregarded in many minor objects, stands revealed; while the development of the art of tastefully grouping natural objects is an ever-present delight. A further source of gratification, in the present instance, is the satisfaction derived from having tried to carry out the suggestions of the "distinguished literary gentleman" who has honored the effort by his felicitous contribution.



THE AMERICAN ELM.

ULMUS AMERICANA, L.

THE early settlers of New England inherited from their English ancestors the love of liberty and the love of home: for the maintenance of the one they planted the common school, and for the adornment of the other, the wayside tree. In front of the new house for the bride, the bridegroom placed the memorial elm. Bride and bridegroom have passed away, and generation after generation of their descendants; the old houses have mostly made way for less substantial but more showy successors, or else have been modernized out of existence; and the trees themselves of colonial date are fast disappearing.

The reasons that led to the frequent choice of the elm as a shade-tree are obvious: it is a comparatively rapid grower, is safely transplanted, requires little care, admits of the severest pruning, and combines in a remarkable degree, when old, size and beauty.

No tree varies more in general aspect. A stroll among the elms in winter, when the foliage that partially concealed their vagaries has fallen, reveals the sturdy individualism of the species.

The *vase* is the form most often assumed by the elm, when, standing in open ground, it is left free to follow its inclinations. The main trunk, reinforced in old trees by huge buttresses, and rising entire from ten to twenty-five feet, separates at length into several nearly equal branches. These rise, diverging but slightly, in straight lines or in broad curves, for thirty or forty feet farther, when they sweep outward, in wide and lofty arches with a pendent border of terminal twigs. The primary limbs, repeatedly subdividing, dissolve into a fine, leafy spray, forming a flat or slightly rounded head. The great elevation, the disposition of the principal limbs, and the extreme elegance of the summit make this form of elm, in the language of Michaux, "the most magnificent vegetable of the temperate zones."

The Lancaster Elm (Plate XVIII) and the Brooks Elm (Plate XII) are fine examples of this type. The vase varies according to the height of ramification.

In the *weeping-willow* form the main trunk seldom exceeds ten feet in height; the branches are more slender and diverge more rapidly, describing broader arches in proportion to the height of the tree; the border of long, flexible, pendulous twigs, swaying with the slightest breeze, comes down within reach of the browsing cows, or even sweeps the ground. In summer a great tree of this form resembles simply a large shrub; it is only when the obscuring leaves have fallen that the marvellous grace of the framework is revealed. The Clark Elm, Lexington (Plate VII) is a perfect illustration.

In the *oak-tree* type, ramification usually takes place within ten or fifteen feet of the ground; the long curves give way to straight lines and abrupt turns, the spray, even in old trees, sometimes retaining its pendulous character; the regular arches disappear, grace and symmetry being transmuted, as it were, in the alembic of Nature, into sturdiness and strength. This form is exemplified in the Pratt Elm, Concord (Plate III), and the Boston Elm (Plate XXIV).

As a forest-tree, the elm runs up to a great height in a single stalk, or in two or three parallel limbs, terminating in a small but graceful head, with a border of slender, pendent spray. Trees of this character, spared now and then by the early settlers in the general clearing up of the forests, standing solitary with naked trunks suggest palms stranded from the shores of tropical seas. Under this head comes the Pittsfield Elm, which fell in a gale some years ago,—a remarkable tree, which rose about a hundred feet before branching. These trees have been classified under the *plume* type; but this term is more felicitously restricted to those trees whose single stem or scarcely diverging limbs sweep out at a considerable height in long, one-sided curves, insensibly tapering to their tips, and clothed with very slender secondary branchlets and fine spray. These do not seem to be survivors of the forest, as they are not uncommon throughout the State on open land, especially on the borders of meadows. There are very few large trees among them.

All elms have a tendency to throw out small reversed branches at the point of ramification, giving rise to the appellation of *feathered* or *fringed* elms. The extent of the feathering varies from a few scattered branchlets to a net-work of short, leafy twigs, which transforms the sober trunks and sometimes the great limbs into shafts of living green.

Feathering is found in all types of elms, but noticeably less in those with broad, spreading tops, as in the oak-tree type, while it is often a conspicuous feature of the true plume type. The cause is not well understood; but wherever

there are few secondary branches, with their numerous subdivisions and consequent expanse of leafy surface, it seems to be more frequent and more extended, as if it were an effort of Nature to maintain the equilibrium between root and leaf development.

These graceful appendages are often lopped from the wayside trees, in cheerful unconsciousness of their æsthetic value; less frequently because it is thought they retard the development of the top. Whatever possible loss in spread or bulk the elm figured in Plate XVII may have experienced has been richly compensated in the lightness and delicacy of its enveloping fringe.

Notwithstanding this amount of variation, no tree is more easily recognized, summer or winter; and there appear to be no forms distinctive enough for good varieties, the various types running into each other by imperceptible gradations.

In fixing the approximate age of living trees, the first requisite is the determination of the rate of growth at different periods of existence. As the range of statistics given is narrow, and the number of cases small, the results reached, while not without value within certain limits, are presented simply as a contribution for future investigation.

A comparison of over a hundred trees, ranging from ten to fifty years of age, shows an average annual increase in diameter of .48 of an inch. Of six trees in Medford forty-three years old, the smallest shows an average annual increase of .28, and the largest of .65.

Upon the estate of Francis Brooks, West Medford, there are many trees of especial interest to the student of arboriculture. These were set out by Peter C. Brooks (b. 1767; d. 1849), who kept a journal in which he entered the date of transplanting. The elms mentioned below are numbered to correspond with the figures in a plan of the estate.

Throughout this article the decimals represent the average annual increase in diameter reckoned in inches.

No.	Age.	Avg. an. inc.
1	118 years . . . . .	.32
2 . . . . .	" " . . . . .	.30
6	80 " . . . . .	.22
7 . . . . .	" " . . . . .	.25
8 . . . . .	" " . . . . .	.32
9 . . . . .	" " . . . . .	.34
12	100 " . . . . .	.39

No. 9 is the most rapid grower of a dozen trees planted at about the same time.

Hammond Elm	1755 to 1838	83 yrs.	Av. an. growth	.60
" "	1838 "	1883 45 "	" "	.51
" "	1883 "	1888 5 "	" "	.19

Some of the measurements were taken at four feet from the ground, and some at five feet; but any resulting error must be inconsiderable, as the girth was nearly uniform within those limits.

Hingham Elm	1729 to 1839,	110 years	Av. an. growth	.397
" "	1839 "	1889, 50 "	" "	.197
Hale Elm	1745 "	1860, 115 "	" "	.403
" "	1860 "	1888, 28 "	" "	.057
Jaques Elm	1713 "	1838, 125 "	" "	.458
" "	1838 "	1889, 51 "	" "	.17
Stone Elm	1763 "	1888, 125 "	" "	.392
Hubbard Elm	1858 "	1877, 19 "	" "	.23
Dexter Elm	1882 "	1890, 8 "	" "	.197
Washington Elm	1844 "	1884, 40 "	" "	.083
Waverly Elm	1882 "	1888, 6 "	" "	.10

The age of the Sheffield Elm is unknown, but is probably not less than one hundred and seventy-five years. In 1844 it had (Emerson) a girth of 16 feet at 5 feet from the ground; in 1890 (J. D. Burtsch) of 18 feet 6 inches. This gives an average annual increase of .21 for forty-six years.

It is interesting to compare these figures with the results reached by Dr. John C. Warren in 1855.

On the Quincy estate, in Quincy, there are two long walks, flanked on each side by double rows of elms. On one of these walks the trees, about two hundred in number, were set out in 1790. In 1855, they were measured by Dr. Warren, at that time President of the Boston Society of Natural History. The five largest of them showed, at 4 feet from the ground, an average girth of 5 feet 8 inches, making an average annual increase of .33+. Five of the smallest had an average girth of 4 feet 2 inches, and an average annual growth of .24+.

The five largest trees measured by the writer in 1889 showed an average girth of 7 feet 6 inches, giving for thirty-four years an average annual increase of .206+.

The statistics of the largest individual tree on Dr. Warren's estate in Brookline are given below:—

	Age.	Girth at 4 feet.	Av. an. growth.
1798 to 1855	57 years	6 feet	.40

A dozen others of the same age were not more than two thirds as large.

A row of elms planted in 1824 on Park Street Mall, Boston, averaged less than four feet in girth. Assuming four feet to be nearly correct,—

	Age.	Girth at 4 feet.	Av. an. growth.
1824 to 1854	30 years	4 feet	.50

Of a line of elms planted on Park Street, the two mentioned below were standing in 1855.

	Age.	Girth at 4 feet.	Av. an. growth.
1786 to 1855	69 years	7 feet 3 inches	.40
" "	"	6 " 4½ "	.35

The annexed statistics of Deerfield Elms have been contributed by George Sheldon:—

No.	Dates.	Age.	Girth at 5 feet.	Av. an. increase.
1	1875-1890,	15 years	2 feet 4½ inches	.60
2	1862-1890,	28 "	4 " 9 "	.65
3	1848-1890,	42 "	7 " 8 "	.697
4	" "	" "	5 " 8 "	.51
5	" "	" "	5 " 3 "	.48
6	1841-1890,	49 "	6 " 4 "	.49
7	" "	" "	6 " 4 "	.49
8	" "	" "	4 " 8 "	.36
9	" "	" "	4 " 5 "	.34
10	About 1809-1890,	81 "	10 " 6 "	.49
11	" "	" "	10 " 8 "	.50
12	" "	" "	8 " 6 "	.40
13	" "	" "	8 " 7 "	.40+
14	" "	" "	8 " 6 "	.40
15	" "	" "	10 " 5 "	.49
16	" "	" "	10 " . . . . .	.47
17	" "	" "	8 " 9½ inches	.41
18	1802-1890,	88 "	9 " 2 "	.397
19	" "	" "	9 " 9 "	.42
20	" "	" "	10 " . . . . .	.43
21	" "	" "	7 " 9 inches	.34
22	" "	" "	13 " 6 "	.586
23	" "	" "	9 " . . . . .	.39

In elms that have attained a longer life and greater size than usual with the species, three periods of life may be roughly outlined.

The first period covers about seventy-five years, during which the growth continues with scarcely abated vigor.

The average annual increase ranges from .22 to .70 in young trees. The Hammond Elm, it will be noted, maintained to the age of eighty-three an average of .60.

The second period extends from seventy-five to one hundred and twenty-five years, during which there is a gradual decrease in the rate of growth, the annual increase ranging from .25 to .50.

The third period covers all life beyond one hundred and twenty-five years. Within the first fifty years of this period,—often within the first twenty-five,—the annual increase falls off very rapidly, so that it can be determined only by careful measurements taken at long intervals. Under this head come the Washington and Waverly Elms, with an increase respectively of .08 and .10.

The age of trees cannot be absolutely settled by the application of an inexorable law of averages. Great size is of itself only *prima facie* evidence of great age. The ordinary conditions that govern tree-life must be taken into account.

1. *Soil.* Cold and clayey soils retard development, while the warm, deep loams of alluvial bottoms are especially favorable. The greater average increase of the Deerfield Elms is thus accounted for. Trees transplanted from the nursery or meadow can never do themselves justice in the made land of streets.

2. *Proximity to water.* The neighborhood of ponds, streams, and meadows gives us the noblest examples of the elm. Their roots often run a hundred feet or more to water, tainting wells and choking drains with compact fibrous masses. Concrete walks diminish the water supply, and dwarf, if they do not eventually kill, adjacent trees.

3. *Proximity of other trees.* Sunlight from all sides is essential to symmetrical development. Street elms are generally planted much too near each other, and the same fault is repeated, with less excuse, in private grounds. The slow growth of the Quincy Elms is largely due to the crowding of these trees within narrow limits. The Dexter Elm has undoubtedly exhausted the soil in its immediate vicinity, for most of its younger companions have attained, at their maturity, only a very moderate size, and already show signs of decadence.

In the absence of all positive evidence regarding the age of a tree, the best that can be done is to determine whether, under existing conditions, a larger or smaller annual increase within the ascertained limits of yearly growth is to be taken as the measure in the tree under consideration. The age of the elm may thus be approximately ascertained. Where trees of the same age and under the same conditions vary greatly in size, the difference in growth must be attributed to difference in vitality of stock.

Much has been written relative to the limits of elm-life, some writers claiming that one hundred years is the maximum, while others allow three hundred.

The ages of many trees figured in this volume have been definitely ascertained or closely approximated from external evidence. The figures are given from the date of transplanting; from five to ten years must be added to cover life from the seed. The list includes trees one hundred years old and upwards.

Avenue of elms on Quincy Estate, Quincy	100 years.
Elm on the Brooks Estate, West Medford	100 "
Two elms " " " "	108 "
Framingham Elm	115 "
Clark Elm, Lexington	120 "
Stone Elm, East Watertown	127 "
Hammond Elm, Natick	130 "
Hale Elm, Boxford	145 "
Elm at Rocky Nook, Hingham	161 "
Whittemore Elm, Arlington . . about	166 "
Old Newbury Elm	177 "
Westford Elm about	190 "
The Pratt Elm, Concord "	190 "

The Dexter Elm, Malden, is undoubtedly over two hundred years,— probably two hundred and fifty; and the Hubbard Elm, North Andover, of about the same age.

The elms of one hundred and fifty years, however youthful a front they put on, disclose somewhere within their vast periphery, in broken branch or incipient decay, an age past their prime. Their powers of resistance have reached the maximum, although the girth and spread slowly increase, almost to the last.

Many of the noble elms mentioned by Emerson in 1846 have disappeared altogether. "The broad, magnificent head" of the elm near Breck's Garden, Lancaster, lies low; the great elm at Springfield, that enlisted in its praise the ready pens of skillful writers; the lofty elm on Pittsfield Common,— these, and others as great if not as well known, have vanished from among trees, and their place knows them not.

Others are in ruinous condition, toppling to their fall. Among them is the old elm on Heard's Island, Wayland, the "great Sheffield Elm," and the "fine old tree still [1846] in perfect vigor which" stood "by the painted gate of the Botanic Garden," Cambridge, and which was cited as an example of the "Etruscan vase type," forming a flat head, with pendent border.

Others, though still grand and symmetrical, afford unmistakable indications of approaching decrepitude. Few, if any, of the trees mentioned in Emerson's book give the impression of undiminished vital force.

There seems to be no reason, in the laws of tree-growth, why an elm may not live on indefinitely, stretching out its buttresses with an ever-mightier hold on earth, and

expanding its summit in ever-widening arches. Considered, however, in the light of evidence, it does not rank among long-lived trees. Two hundred years is a great age; few reach two hundred and fifty; while it may be doubted if any vestige, stump, or root is to be found of an elm born three hundred years ago.

The day of destiny may be put off by minimizing the natural causes that tend towards dissolution. The exhaustion of the soil can be remedied by the restoration of the elements taken from it. When decay has already set in, the dead portions may be thoroughly removed, and the cavities filled with cement; extensive injuries have thus been treated successfully, and the cavities themselves obliterated. But the greatest peril of the tree lies in the operation of causes foreign to its own constitution. The wider the spread of its leafy sails, the more likely it is to go down before the sweep of winter's winds; and if, happily, it escapes the resistless tornado, there is no escape from the terrible pull of gravity. The constantly increasing tendency of the great diverging limbs to split asunder may be overcome for a while by bolting them together with iron rods, or propping them up with pillars, like the Neustadt lime; but there comes a day in the steady roll of the seasons when increasing weight overcomes diminishing resistance, and the shapely arches lie prostrate.

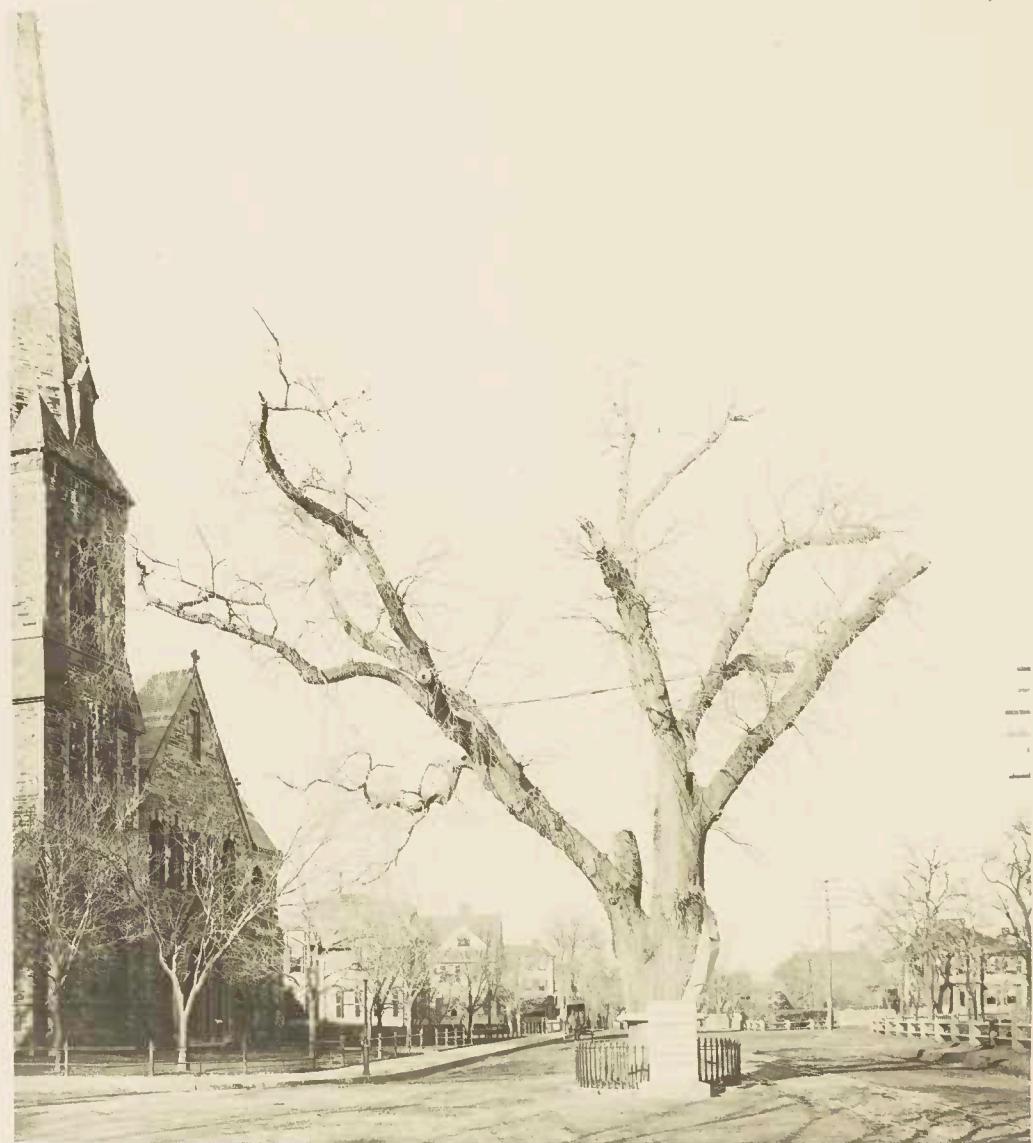
The sun of a winter morning shines down upon no spectacular display that rivals a big tree, its vast skeleton, down to the minutest twig, encased in glittering ice. This gorgeous effect is brought about at a ruinous expense. The ice-coat probably doubles the weight of the top; twigs are everywhere torn from their supports; limbs are broken off; the strain at the separation of the primary branches from the trunk—the point of greatest structural weakness—is prodigious.

A serious injury once received, the elm breaks up with great rapidity. Fifty years hence most of the elms figured in this volume, it is likely, will have become, like the Waverly Elm (Plate IX.), the wrecks and memorials of a stately past.

The roadside elm will probably become less common in agricultural districts than at present,—the farmer has suffered too much from its predatory roots; but there will never be a dearth of noble trees. Thrifty elms of seventy-five to a hundred years old, ranging from nine to fifteen feet in girth, are scattered in favorable situations over the State. These will, in their turn, put on the mien of sovereignty and receive the homage of men.



I.

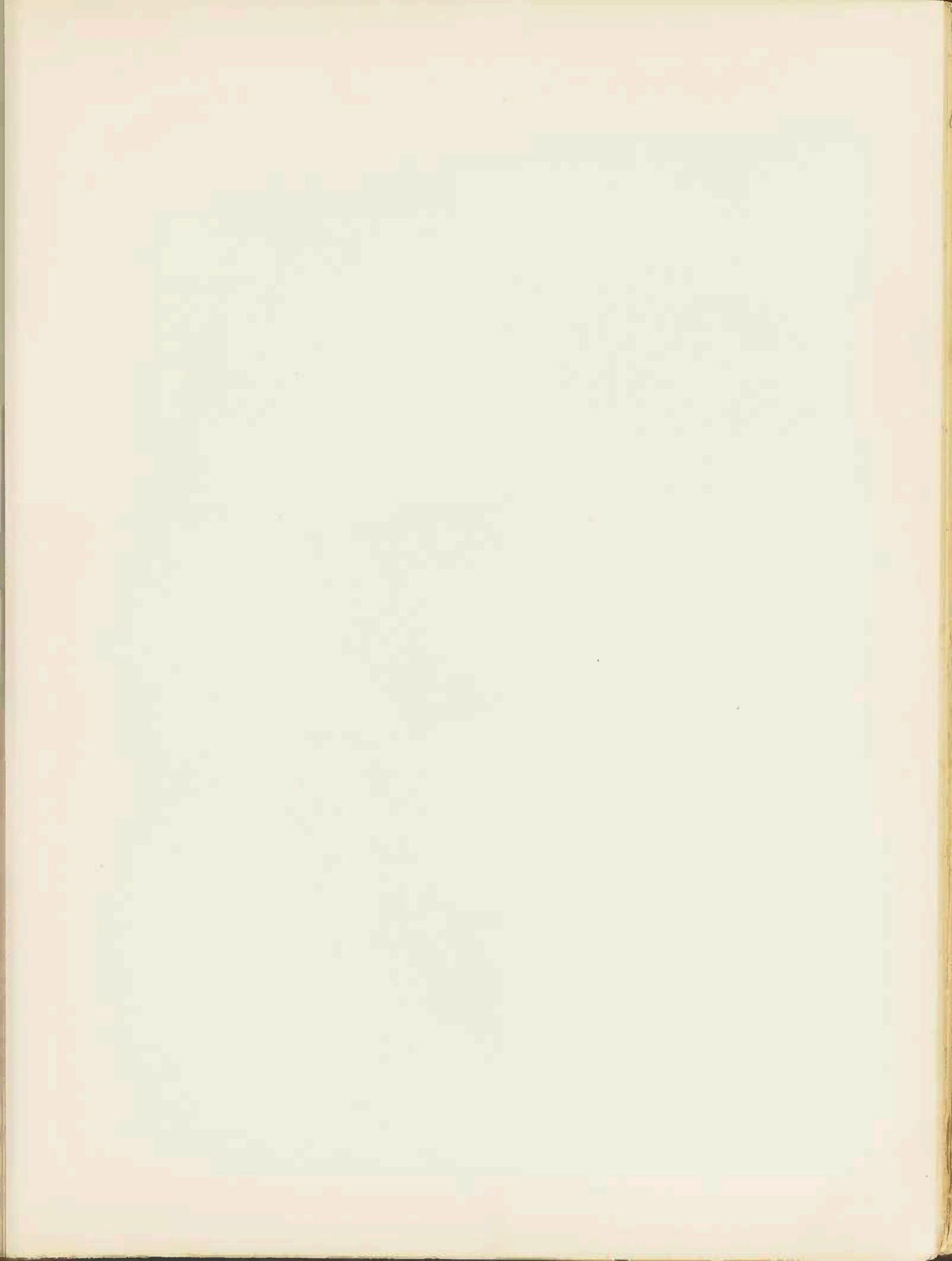


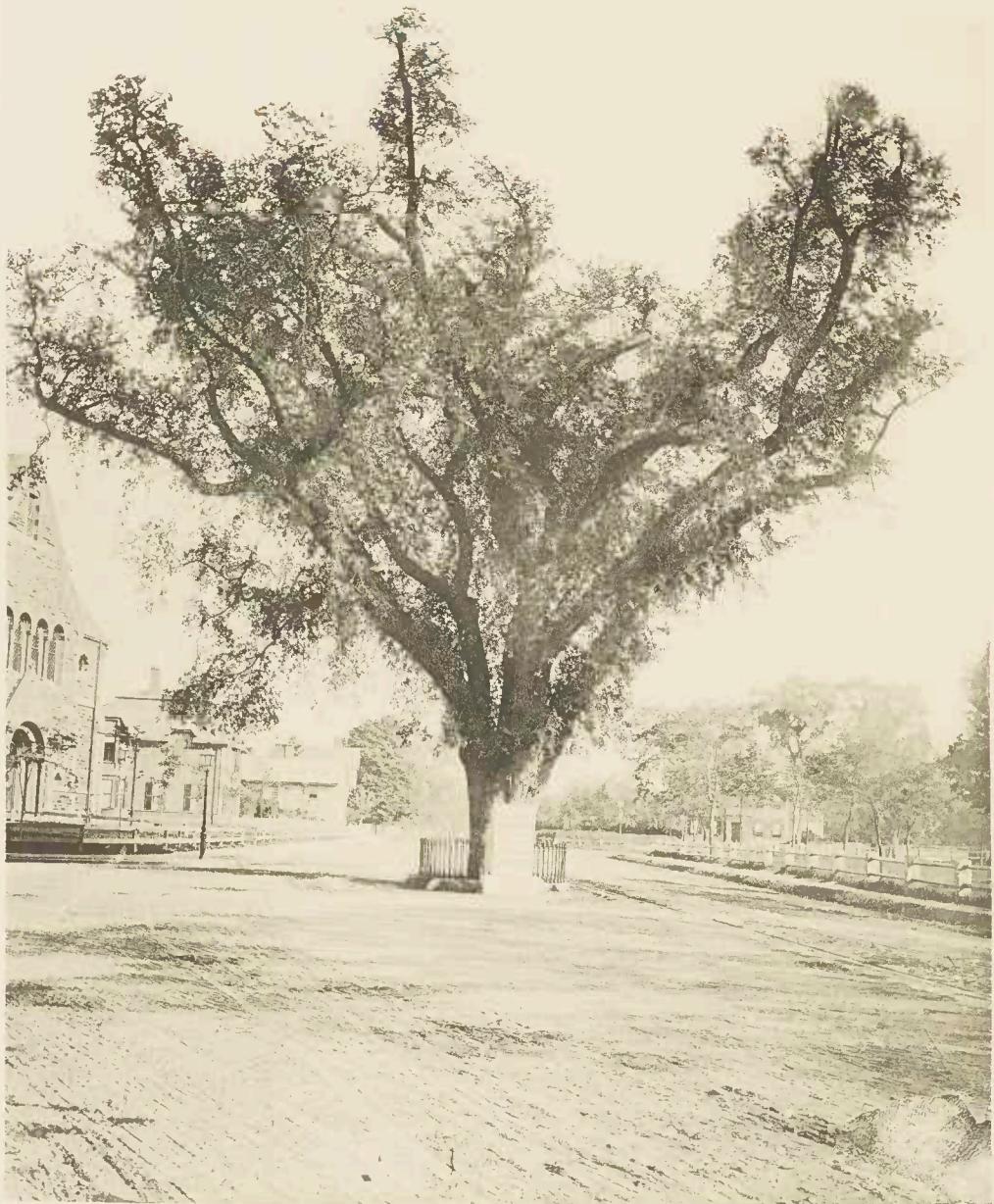
THE WASHINGTON ELM, CAMBRIDGE.

1889.









THE WASHINGTON ELM, CAMBRIDGE.

1870.

FROM A PLATE BY J. W. BLACK.





THE WASHINGTON ELM.

Under the brave old tree
Our fathers gathered in arms, and swore
They would follow the sign their banners bore,
And fight till the land was free. — HOLMES.

ON the south side of the Common in Old Cambridge stands the famous Washington Elm, most honored of American trees, living or dead. It is of goodly proportions; but as far as girth of trunk and spread of branches constitute the claim upon our respect, there are many nobler specimens of the American elm in historic Middlesex.

Extravagant claims have been made with regard to its age, but it is doubtful if any tree of this species has ever rounded out its third century. Under favorable conditions, the growth of the elm is very rapid, a single century sometimes sufficing to develop a tree as large as the Washington Elm.

When Governor Winthrop and Lieutenant-Governor Dudley, in 1630, rode along the banks of the Charles in quest of a suitable site for the capital of their colony, it is barely possible the great elm was in being. It would be a pleasant conceit to link the thrifty growth of the young sapling with the steady advancement of the new settlement, enshrining it as a sort of guardian genius of the place, the living witness of progress in Cambridge from the first feeble beginnings. As Mrs. Sigourney writes,—

“I heard the bleak December tempest moan
When the tossed ‘Mayflower’ moored in Plymouth Bay,
And watched yon classic walls as, stone by stone,
The fathers reared them slowly towards the day.”

The life of the tree, however, probably does not date farther back than the last quarter of the seventeenth century. In its early history there was nothing to distinguish it from its peers of the greenwood. When the surrounding forest fell beneath the axe of the woodman, the trees conspicuous for size and beauty escaped the general destruction; among these was the Washington Elm, but there is no evidence that it surpassed its companions.

Tradition states that there once stood on the northwest corner of the Common another large elm, under which the Rev. George Whitefield, the evangelist, preached in 1745. Some claim that it was the Washington Elm under which the sermon was delivered. The two trees stood near each other, and the hearers were doubtless scattered under each. But the great elm was destined to look down upon scenes that stirred the blood even more than the vivid eloquence of a Whitefield. Troublous times had come, and the mutterings of discontent were voicing themselves in more and more articulate phrase. The old tree must have been privy to a great deal of treasonable talk,—at first whispered with many misgivings, under the cover of darkness; later, in broad daylight, fearlessly spoken aloud. The smoke of bonfires, in which blazed the futile proclamations of the king, was wafted through its branches. It saw the hasty burial, by night, of the Cambridge men who fell on the nineteenth of April, 1775; it saw the straggling arrival of the beaten, but not disheartened, survivors of Bunker Hill; it saw the Common—granted by the town as a training-field—suddenly transformed to a camp, under General Artemas Ward, commander-in-chief of the Massachusetts troops.

The crowning glory in the life of the great elm was at hand. On the twenty-first of June, Washington, without allowing himself time to take leave of his family, set out on horseback from Philadelphia, arriving at Cambridge on the second of July. The fictitious Journal of Dorothy Dudley describes with florid eloquence the exercises of the third.

“To-day he [Washington] formally took command, *under one of the grand old elms* on the Common. It was a magnificent sight: the majestic figure of the general, mounted upon his horse beneath the wide-spreading branches of the patriarch tree, the multitude thronging the plain around, and the houses filled with interested spectators of the scene, while the air rung with shouts of enthusiastic welcome as he drew his sword, and thus declared himself commander-in-chief of the Continental army.”

Although no contemporaneous pen seems to have pointed out the exact tree beyond all question, happily the day is not so far distant from us that oral testimony is inadmissible. Of this there is enough to satisfy the most captious critic.

Where the stone church is now situated, there was formerly an old gambrel-roofed house, in which the Moore family lived during the Revolution. The situation was very favorable for observation, commanding the highroad from Watertown to Cambridge Common, and directly opposite the great elm. From the windows of this house the spectators saw the ceremony to good advantage, and one of them, styled,

in 1848, the "venerable Mrs. Moore," lived to point out the tree, and describe the glories of the occasion, seventy-five years afterward. Fathers, who were eye-witnesses standing beneath this tree, have told the story to their sons, and those sons have not yet passed away. There is no possibility that we are paying our vows at a counterfeit shrine.

Great events, which mark epochs in history, bestow an imperishable dignity even upon the meanest objects with which they are associated. When Washington drew his sword beneath the branches, the great elm, thus distinguished above its fellows, passed at once into history, henceforward to be known as the Washington Elm.

It was often honored by the presence of Washington, who, it is said, had a platform built among the branches, where, we may suppose, he used to ponder over the plans of the campaign. The Continental army, born within the shade of the old tree, overflowing the Common, converted Cambridge into a fortified camp. Here, too, the flag of thirteen stripes for the first time swung to the breeze.

These were the palmy days of the elm. When the tide of war set away from New England, the Washington Elm fell into unmerited neglect. The struggling patriots had no time for sentiment; and when the war came to an end they were too busy in shaping the conduct of the government, and in repairing their shattered fortunes, to pay much attention to trees. It was not until the great actors in those days were rapidly passing away that their descendants turned with an affectionate regard to the enduring monuments inseparably associated with the fathers. Among these the Washington Elm deservedly holds a high rank.

On the third of July, 1875, the citizens of Cambridge celebrated the one hundredth anniversary of Washington's assuming the command of the army. The old tree was the central figure of the occasion. The American flag floated above the topmost branches, and a profusion of smaller flags waved amid the foliage. Never tree received a more enthusiastic ovation.

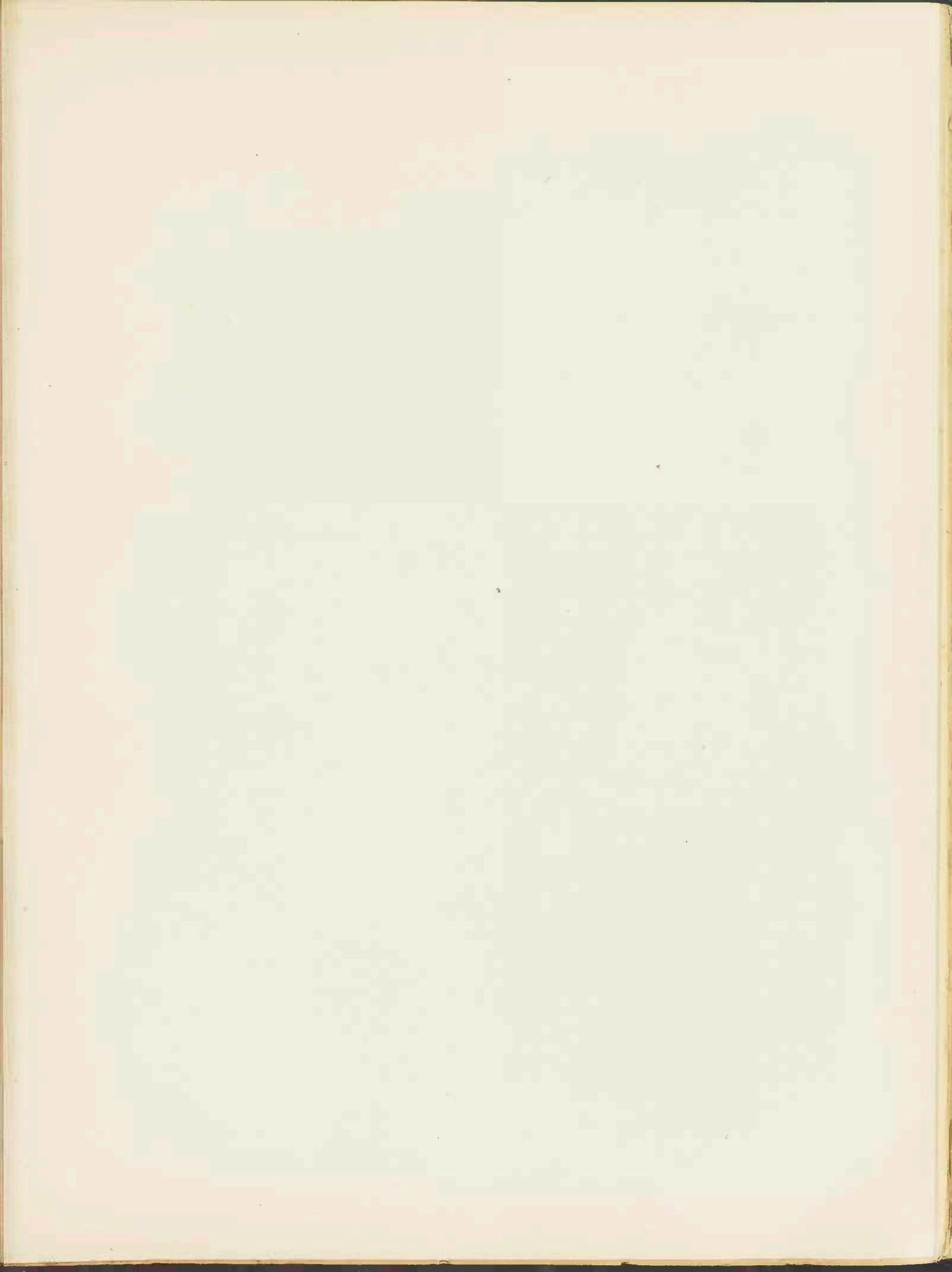
It is enclosed by a circular iron fence, put up by the Rev. Daniel Austin. Outside the fence, but under the branches, stands a granite tablet erected by the city of Cambridge, upon which is cut an inscription written by Longfellow:—

UNDER THIS TREE
WASHINGTON
FIRST TOOK COMMAND
of the
AMERICAN ARMY,
JULY 3d, 1775.

In 1850 it still retained its graceful proportions; its great limbs were intact, and it showed few traces of age. Within the past twenty-five years it has been gradually breaking up.

In 1844 its girth, three feet from the ground, where its circumference is least, was 12 feet $2\frac{1}{2}$ inches. In 1884, at the same point, it measured 14 feet 1 inch,—a gain so slight that the rings of annual growth must be difficult to trace: an evidence of waning vital force. The grand subdivisions of the trunk are all sadly crippled; unsightly bandages of zinc mask the progress of decay; the symptoms of approaching dissolution are painfully evident, especially in the winter season. In summer, the remaining vitality expends itself in branchlets which feather the limbs and give a false impression of vigor.

Never has tree been cherished with greater care, but its days are numbered. A few years more or less, and, like Penn's Treaty Elm and the famous Charter Oak, it will be among the things that were.





THE PRATT ELM, CONCORD.





THE PRATT ELM.

"What tales, if there were tongues in trees,
This giant elm could tell."

A STROLL of about a mile from the soldiers' monument in Concord Centre, past the house of Emerson and the Old Manse, and past the narrow lane that runs under the pines down to the Minute Man, brings the traveller abreast of a majestic tree, standing near the highway, in front of the residence of F. G. Pratt. The present house, built in 1849, is situated on the site of an old-style frame building erected not later than the year 1700; and in the same year two elms, it is said, were set out, of which the Pratt Elm is the survivor. There is no record of their early history; they grew in silence and obscurity till they overtopped their fellows and found themselves famous. In 1845 one of them had already lived out its arboreal span, while the other had long been known as the "Great Elm." It is still in the full vigor of maturity; in its sturdy grandeur there is little hint of decay. The erratic growth of the great limbs, and the wide angle at which they strike out from the trunk, make it the most conspicuous exemplification of the oak-tree type in our list of American elms, and worthy to be reckoned among the historic celebrities even in historic Concord.

Measurements by Minott Pratt in 1874, and F. G. Pratt in 1890:—

	1874.	1890.
Girth at 1 foot from ground	21 feet 8 inches.	22 feet.
" " 5 feet " "	17 feet 1 inch.	
" " 10 feet, just below where it branches	16 feet 11 inches.	16 feet 11 inches.
" of largest branch	10 " 5 "	11 " 2 "
" " branch next in size	10 " 4 "	10 " 7 "
Height	85 "	

THE OLD ELM AT ROCKY NOOK.

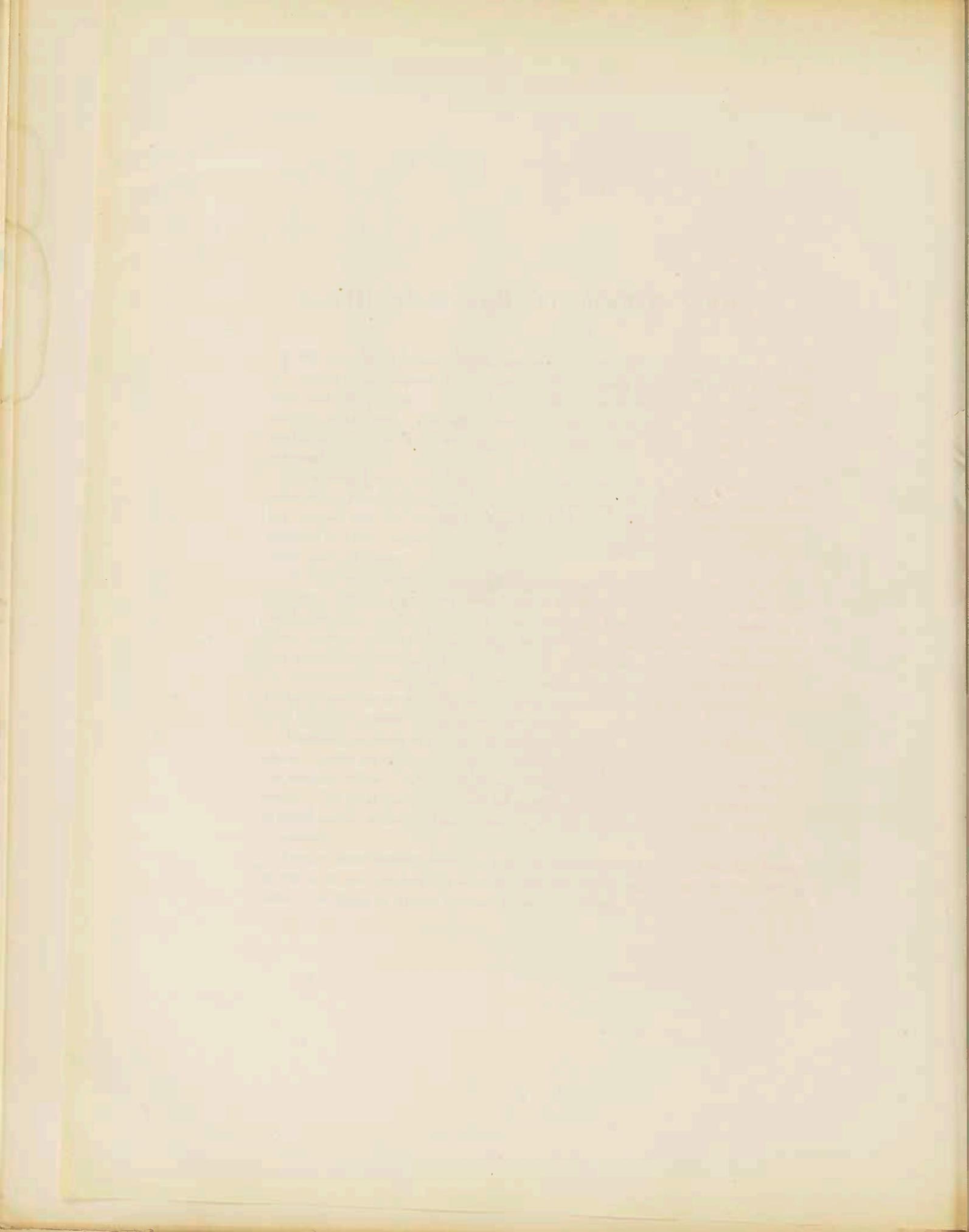
THE old Cushing house, in Hingham, was built in 1679 by Peter Cushing, and has always been owned and occupied by the Cushing family. With its two-story front, and roof sloping to one story in the rear, it is an interesting survival of early colonial architecture. Directly opposite the house is a large, wide-spreading elm, its buttressed trunk encrusted with the brilliant yellow lichen common near the sea-coast.

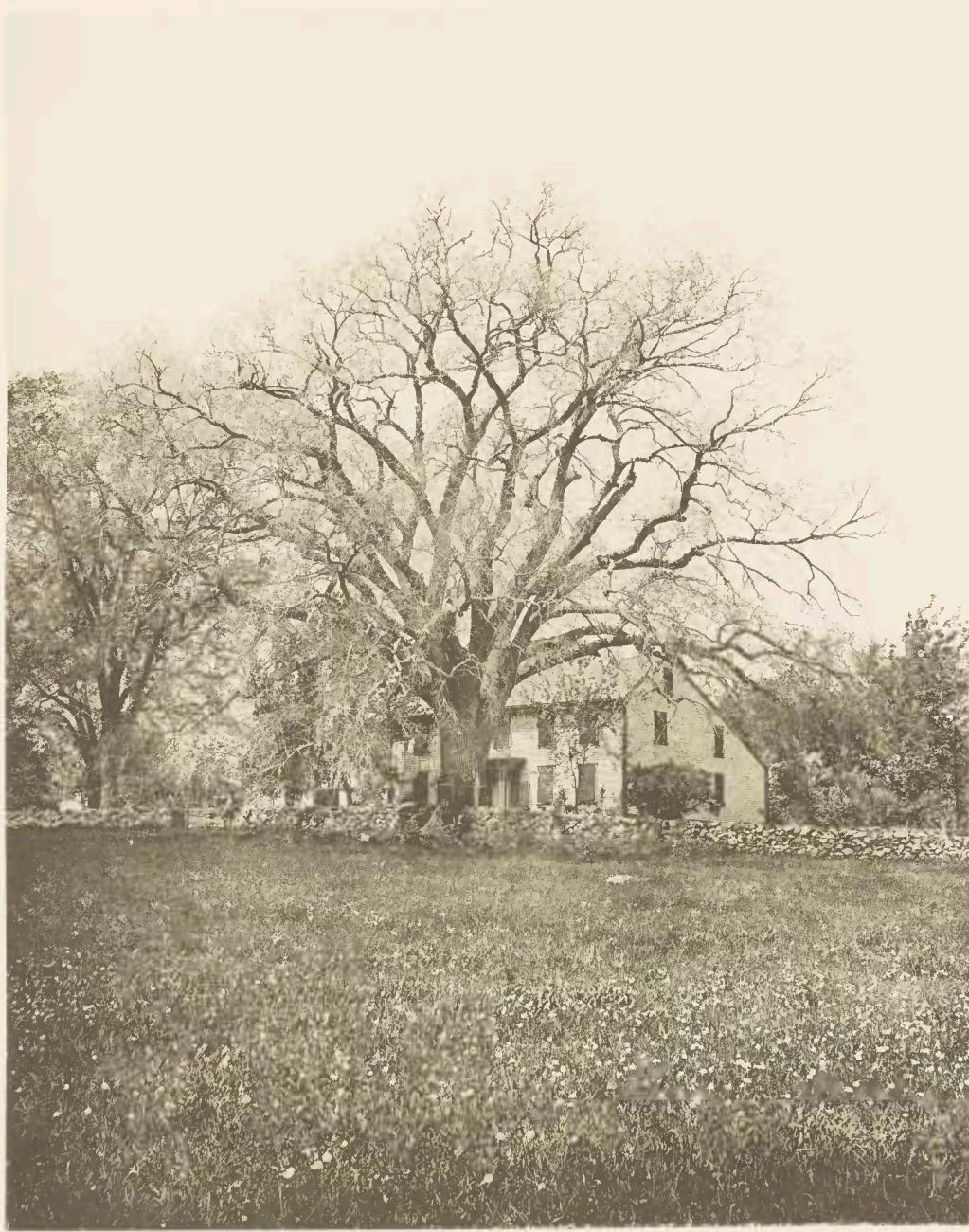
It is seldom that the biographer of trees can arrive at absolute dates. It is an occasion for rejoicing when some early settler, interested in trees, kept a diary which has escaped rats and ragmen even to our day. It is thus we know that Stephen Cushing in 1729 "removed" this elm across the street, because it was too large to stand near the house.

In 1812 it had become big enough to play a part in the patriotic drama then upon the stage. British ships of war were lying at anchor off Cohasset, and a descent upon the South Shore was imminent. It is said that the Hingham company, mustered to repel invaders, halted, on their march to the coast, beneath this elm, and listened to a sermon on the duties of the hour. May we not, with the lively imagination of the ancient Greek, believe that the tree — native American in root and branch — was no indifferent spectator of the scene; that some occult influence emanating therefrom fired the preacher with patriotic eloquence?

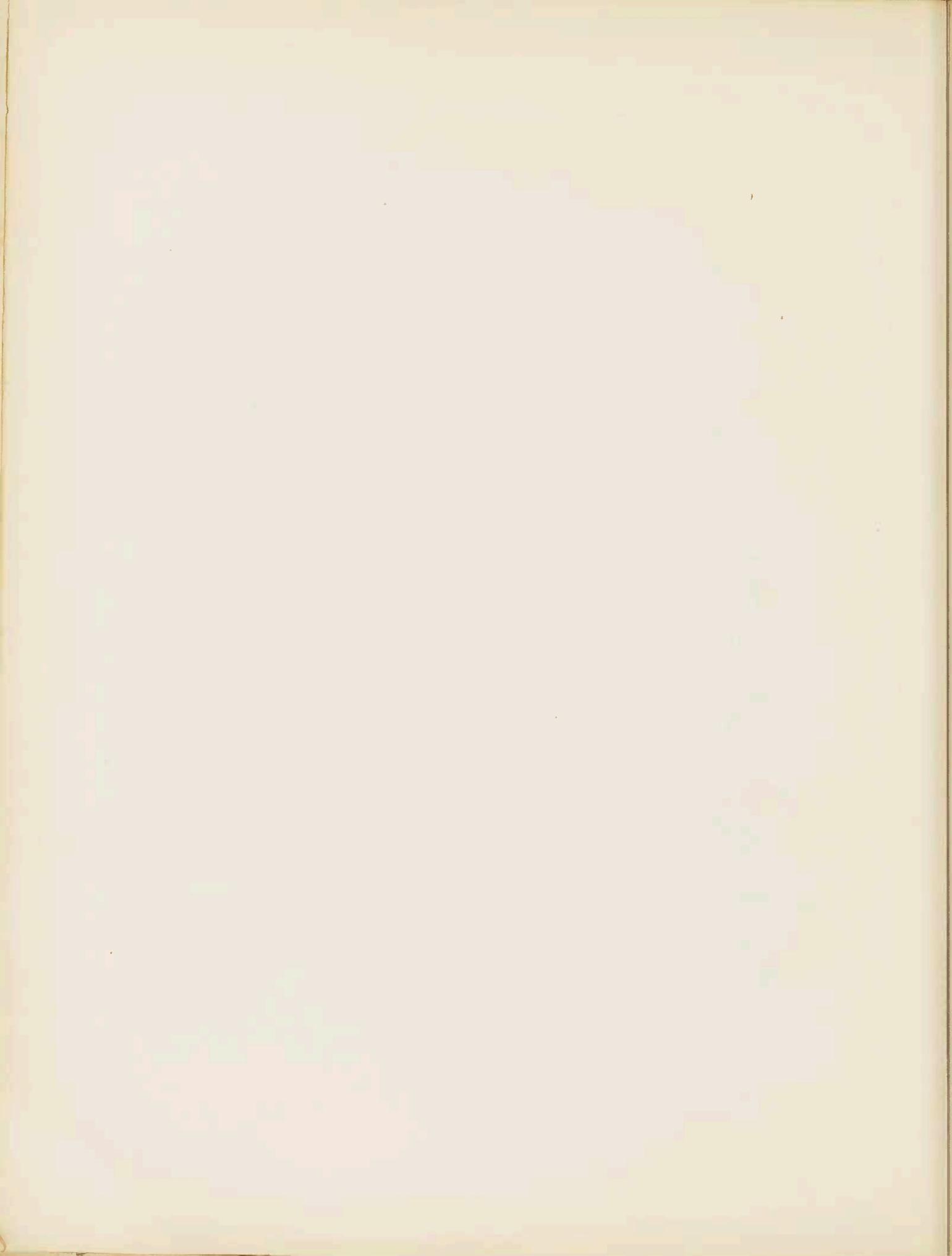
Emerson visited it in 1839, and a full description appears in his Report. He places it under the oak-tree type; but at the present date, when in foliage, it suggests the weeping-willow. In fact the most characteristic feature of this tree is its symmetry. The great limbs are thrown out uniformly from the trunk, and sweep upward in broad curves, while the lower branches, at their extremities, approach the ground in summer.

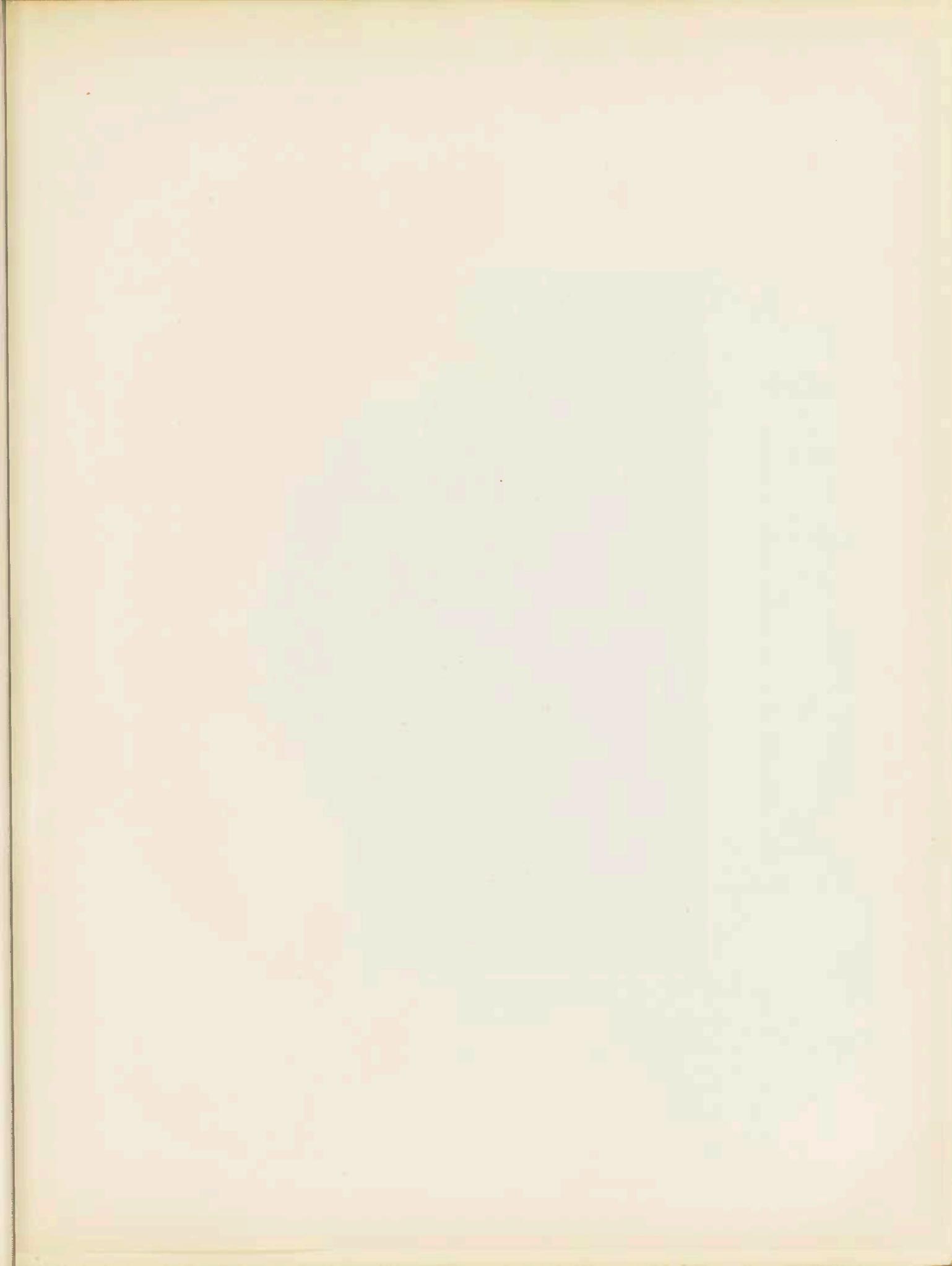
Despite some damage from the severe gales of the past two winters, and despite its weight of one hundred and seventy years, the elm is still at its best, and, saving accident, is likely to outlive another generation of men.





THE OLD ELM AT ROCKY NOOK, HINGHAM.

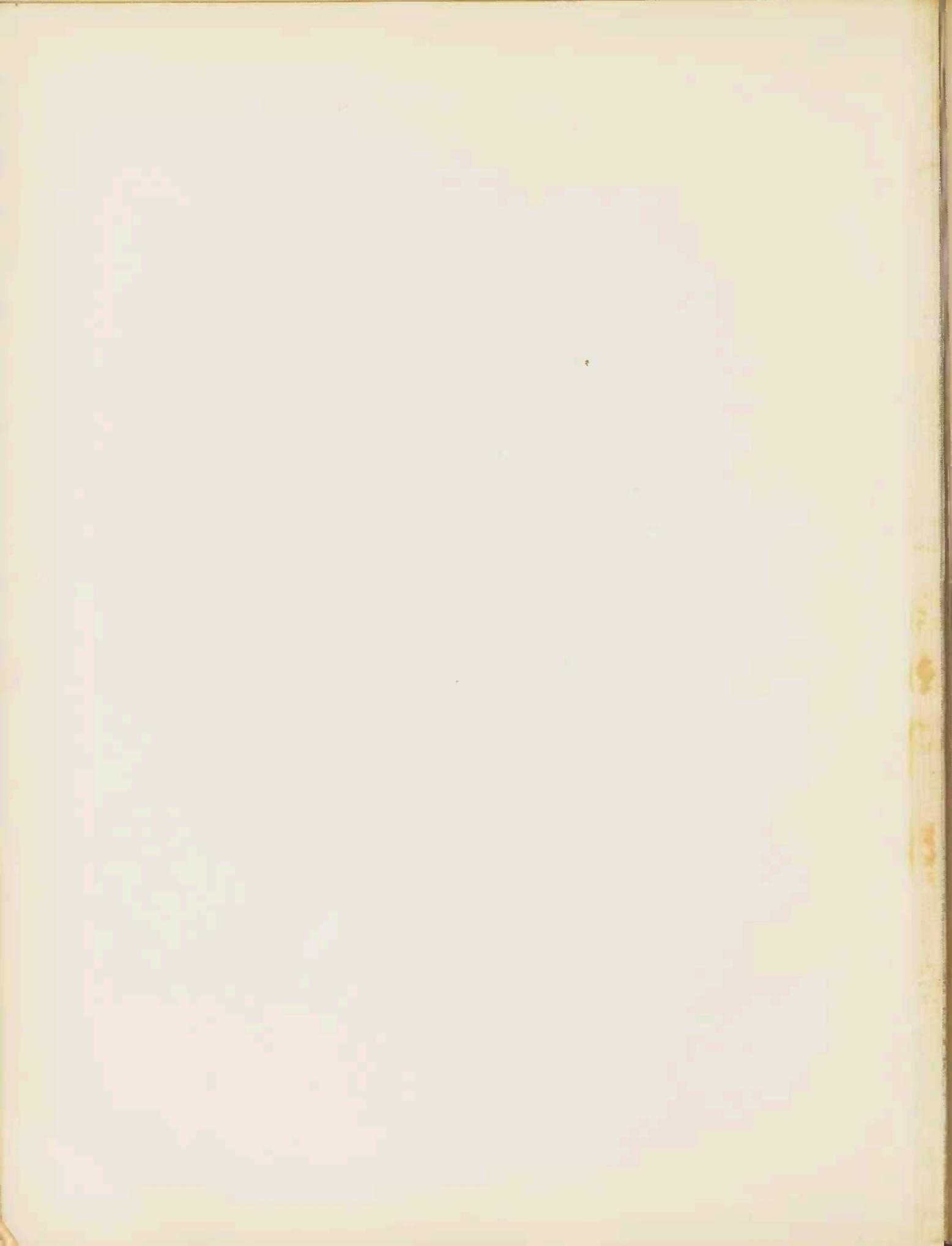




V.



THE OLD ELM AT ROCKY NOOK, HINGHAM.



In 1839 the measurements, according to Emerson, were:—

Girth at 4½ feet	13 feet.
Height	60 to 70 "
Spread	90 "

In 1889:—

Girth at 4½ feet	15 feet 7 inches.
" "	15 " 5 "
Height	72 "
Spread	110 "

THE HAMMOND ELM.

The axe's edge did oft turn again,
As half unwilling to cut the grain;
For it had been an ancient tree,
Sacred with many a mysterie.—SPENSER.

THIS well-known tree stood on the south side of the road leading from Natick to Wayland, opposite the residence of Edward W. Hammond. It was set out in 1760 by William Hammond, the first of the family to settle in Natick. According to Mrs. Lydia Bacon Hammond (b. 1788, d. 1889), it was conspicuous for its size and beauty early in the present century. In 1838 it had become a celebrity, and its biography was recorded in Emerson's "Trees and Shrubs." At that date it measured 13 feet in girth at four feet from the ground, and its greatest spread was 102 feet. In 1883 its girth at five feet was 19 feet 3 inches, and in 1888, 19 feet 7 inches.

The trunk separated, at eight or nine feet from the ground, into two enormous branches, respectively subdividing at wide angles, forming a very symmetrical head, not more than seventy feet in height, but spreading, at its best, over a circle of one hundred and ten feet in diameter. The great southern branch was wrenched off by the wind in 1879; but the northern branch, still vigorous, threw a noble, leafy arch far across the highway into the adjacent field. Unlike most old elms, its limbs kept their drooping habit to the last, and the twigs showed an annual increase of several inches.

In the summer of 1888, when the accompanying likeness was taken, its abundant vitality promised years of life; but its destruction was already a foregone conclusion. The Natick and Cochituate Street Railway was opened to the public in 1885. The track ran beneath the mighty arch; and when the branches creaked in the wind, the passengers looked up and trembled. The old tree fell a victim to the fears of the travelling public. In the fall of 1889 the selectmen, despite the protests of its friends, ordered it cut down. "The part considered dangerous," writes Mr. Hammond, "was found to be as sound as a rock."

The tree had a wide circle of friends. In Natick, it fairly divided the honors with the Eliot Oak. It is said that Thoreau once made an appointment with it, and that the genial Autocrat has encircled it with his tape.

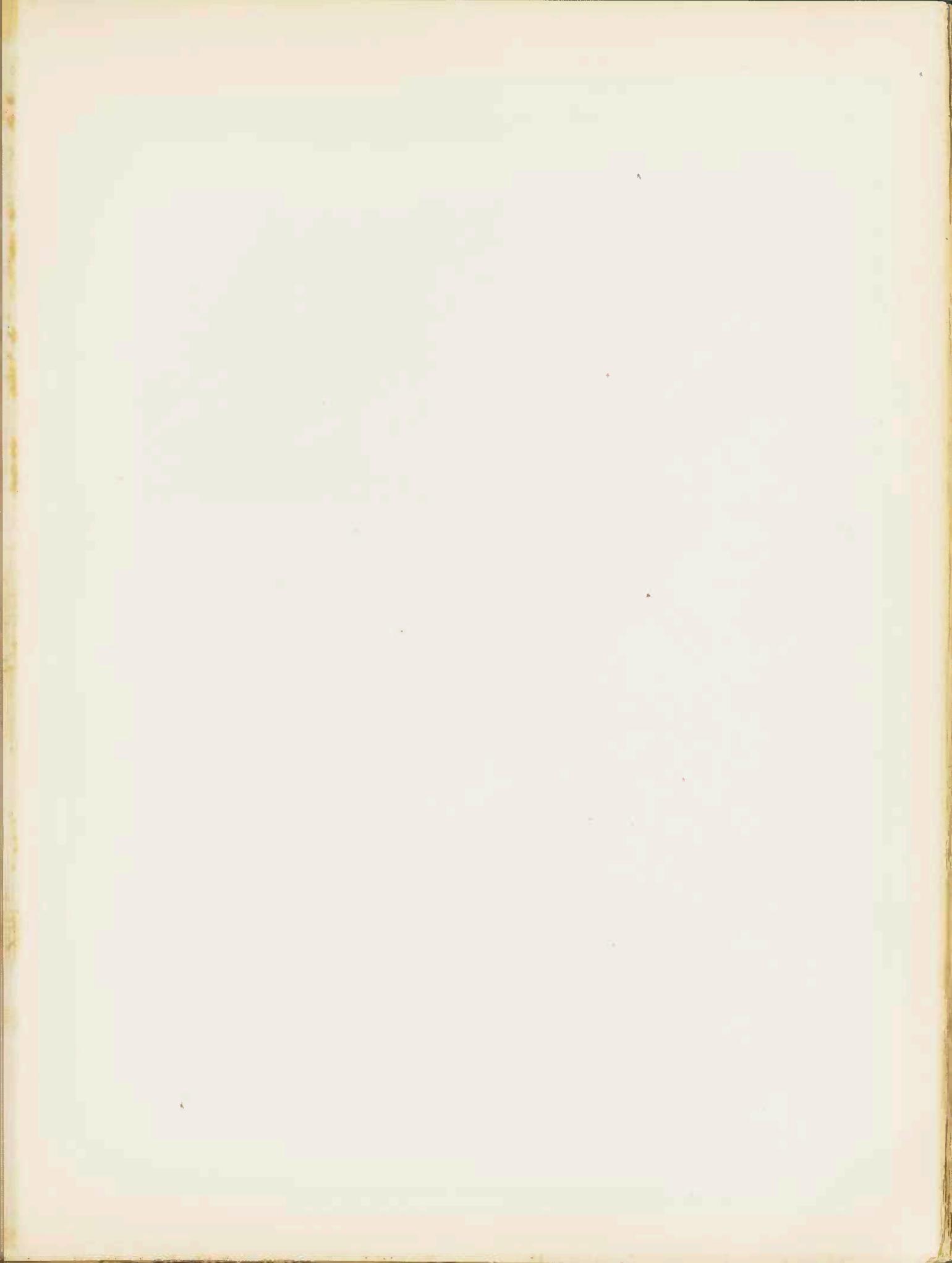
The horizontal wand in this portrait is ten feet long.





THE HAMMOND ELM, NATICK.





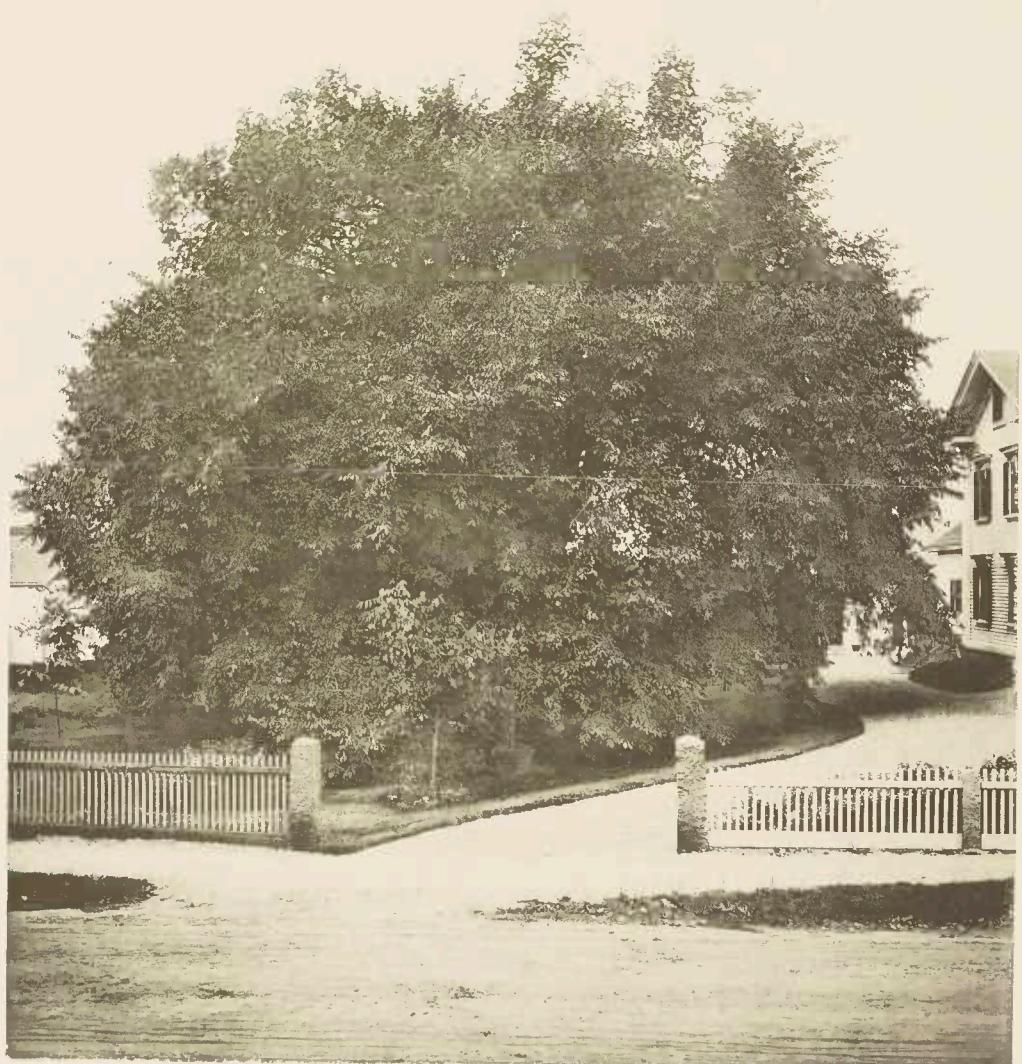


THE CLARK ELM, LEXINGTON.



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THE CLARK ELM, LEXINGTON.





THE CLARK ELM.

A MONG elms of the willow-tree type, the finest in the State probably is to be found in Lexington. It is known to many; for it stands amid scenes memorable in Revolutionary annals. It is upon the premises of the Clark-Hancock house, whose history is summarized in the tablet:—

BUILT 1698.—ENLARGED 1734.
RESIDENCE OF
REV. JOHN HANCOCK 55 YEARS,
& OF HIS SUCCESSOR
REV. JONAS CLARK 50 YEARS.
HERE SAMUEL ADAMS &
JOHN HANCOCK WERE SLEEPING
WHEN AROUSED BY PAUL REVERE,
APRIL 19, 1775.

It was within ear-shot of Major Pitcairn when he called upon the Lexington rebels to throw down their arms and disperse. It was but a stripling on that day, having been set out only five years before by the Rev. Jonas Clark, named in the tablet. Its age, accordingly, must be about a hundred and twenty-five years.

The trunk forks at 4 feet 10 inches from the ground, suggesting somewhat the union of separate trees. The subdivisions of the two great branches spring lightly upwards in noble arches, the branchlets at their extremities sweeping the ground even in winter, and in summer, when weighted down by the leaves, presenting the appearance of an immense leafy dome poised upon a tremulous edge of green.

Circumference at four feet	13 feet 5 inches.
Circumference of one branch at point of furecation	8 " 7 "
Circumference of the other branch	8 " 8 "
Height about	70 "
Spread	84 to 90 "

THE WAVERLY ELM.

The blast hath lopped my branches away, and I tremble at the winds of the north.

— MACPHERSON: *Ossian*.

THIS ancient tree stands on the east side of Beaver Brook, a few rods from the water's edge, in the low land which the elm most affects. Situated at the natural entrance to the Waverly Oaks, it is a worthy guide and striking landmark, conspicuous from the neighboring highway, rising grandly amid an undergrowth of barberry-bushes, alders, and low trees. The top has been wrenched off, in what gale local tradition saith not; but the lateral branches still mark, at their widest stretch, a diameter of 117 feet,—though their extremities, as in most old trees, have long since disappeared, each winter's winds further curtailing length of limb, and strewing the ground with wreckage.

In July, 1882, at five feet from the ground, its circumference was 17 feet, 1 inch; in June, 1888, 17 feet, 3 inches; its height was 55 feet. At irregular intervals, as far as sixty feet from the base of the tree, the roots project in curious convoluted masses, from three to six inches high.

Its age cannot be definitely stated. On the testimony of competent witnesses, fifty years ago, it was the largest elm in the vicinity. Impressions of this kind, however, are unsafe guides, and here the situation is extremely favorable for rapid growth. Neither can any surer conclusion be drawn from its present decrepitude, the cause of which may be referred to the accident before mentioned. Reasoning from the scanty data known, the age must be at least one hundred and fifty years, and is probably greater.

At all seasons of the year great trees are good to look upon. Some are finest when enveloped in clouds of green; others when stripped, like athletes, their mighty arms bared for conflict with the elements. This tree is most impressive in autumn, when its leaves are turned to bright yellow, and the glints of sunlight play upon a trunk of singularly tender color,—one of the most poetic grays of the New England landscape.

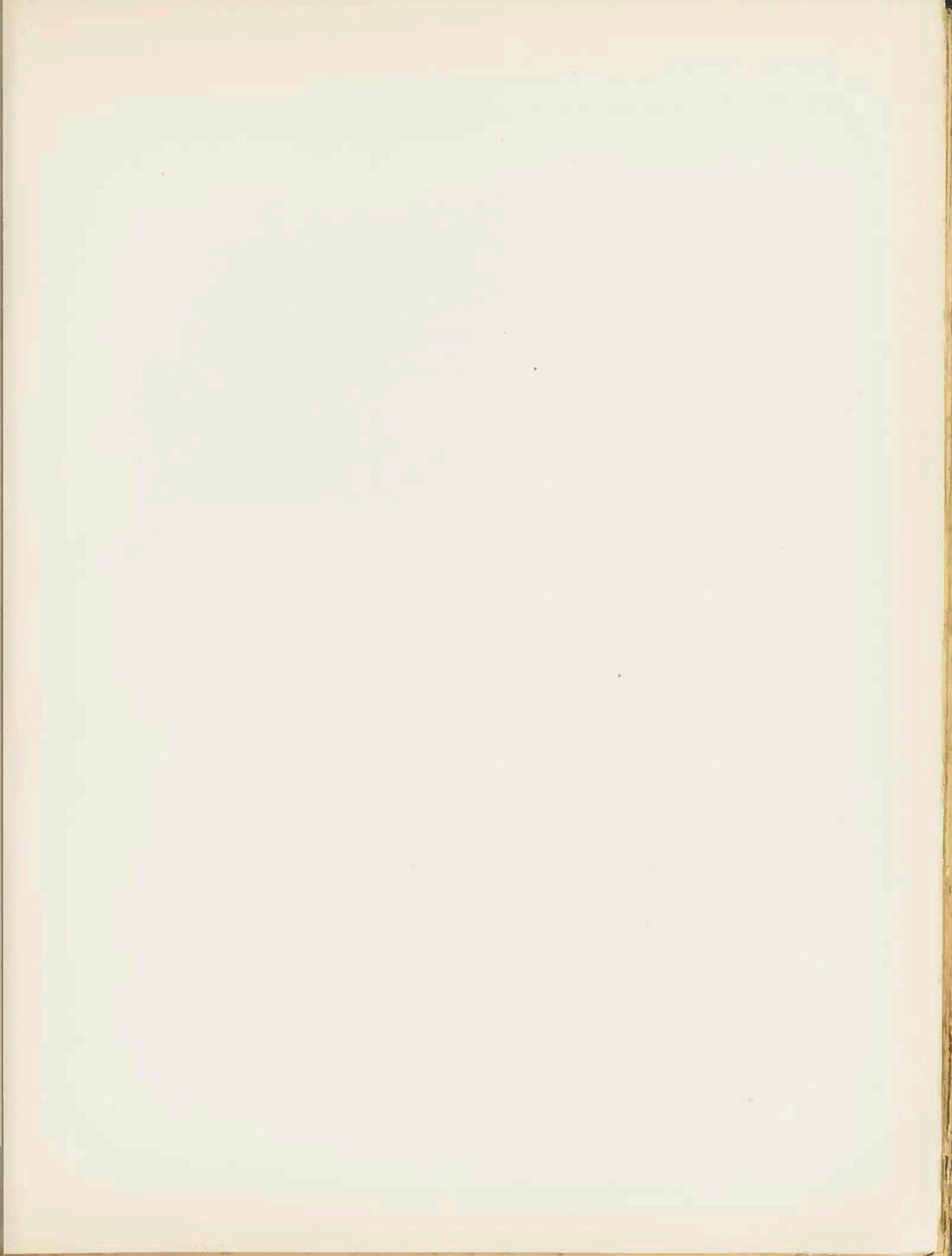




IX.



THE OLD ELM, WAVERLY.



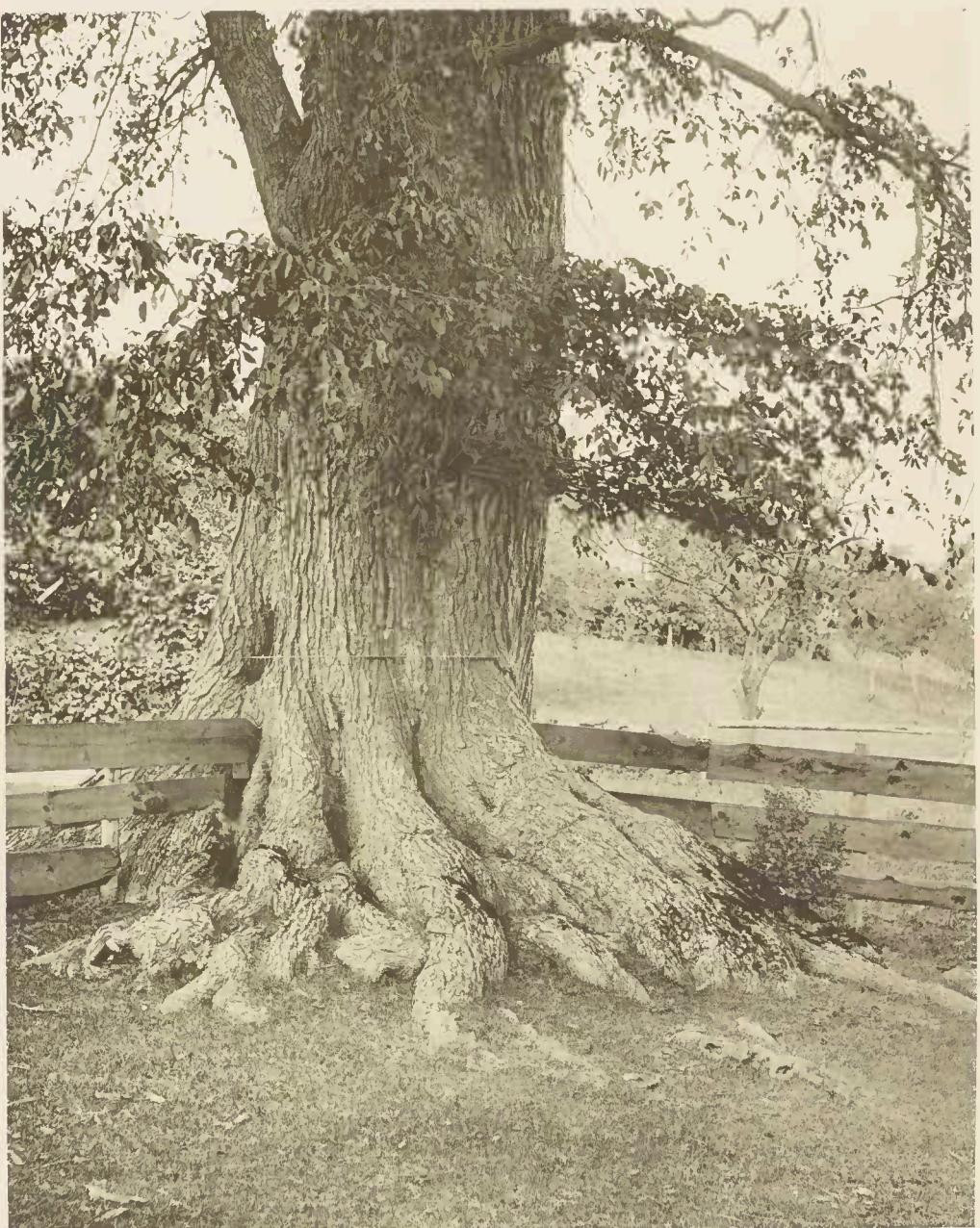


THE HUBBARD ELM, NORTH ANDOVER.

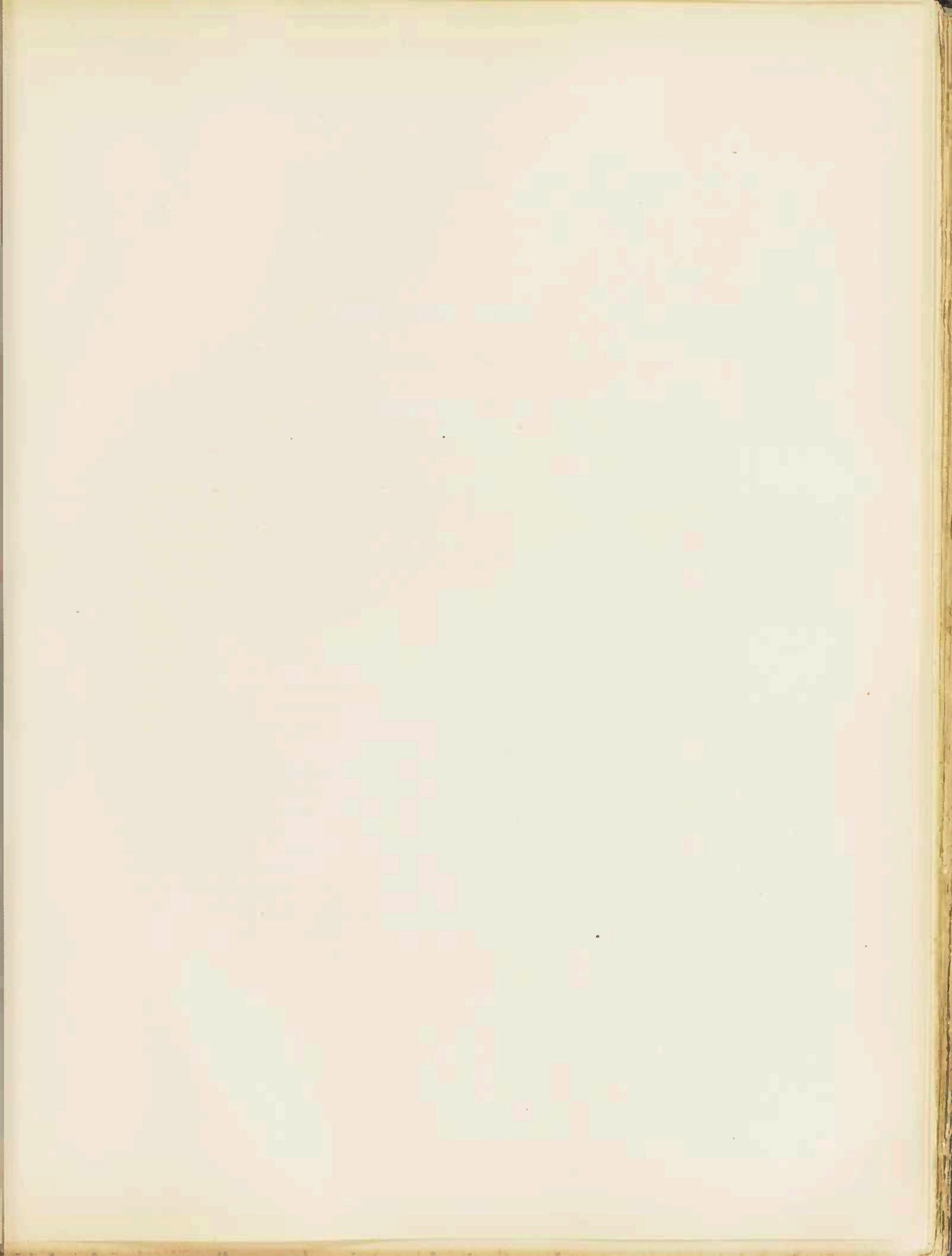


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THE HUBBARD ELM, NORTH ANDOVER.





THE HUBBARD ELM.

The ancient masters of the soil I knew.—MRS. SIGOURNEY.

THIS tree stands on the farm of Nathan Foster, in North Andover, near the Boxford line. This section of the State was settled early, and noble roadside trees are not uncommon; but the Hubbard Elm surpasses them all in size and grandeur.

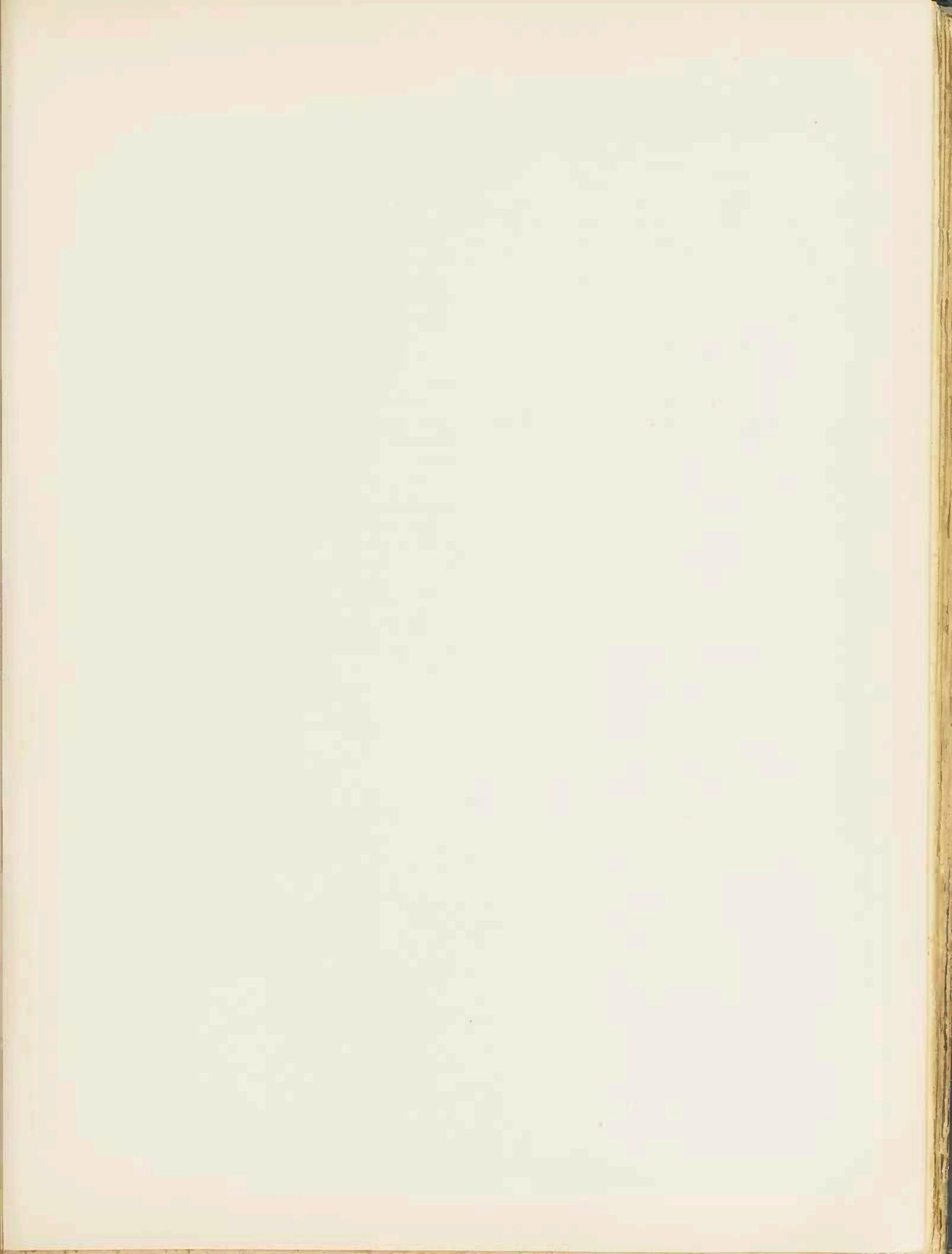
At five feet above the level of the adjacent highway it measures 20 feet 10 inches in circumference, and little diminution is apparent for twenty-five or thirty feet. At the height of fourteen feet it throws out a branch a foot in diameter, of a drooping habit, and seemingly of recent growth; but the main division takes place at some thirty feet from the ground. Here the trunk separates into two parts, these subdividing a little higher up into four, and again into seven massive limbs, which rise at sharp angles, throwing out small branches here and there, subdividing near the top of the tree. The tortuous growth of the upper limbs, taken in connection with many knotty bunches of twigs, suggests the possibility that storms have made havoc with the top, while the lower limbs have remained uninjured. The facts ascertained confirm this impression. The head has been much reduced in size during the last forty years by ice, fire, and heavy winds. It suffered severely in the great April gale of 1851, when the lighthouse on Minot's Ledge was swept away. A small photograph taken thirty years ago, and now in possession of Miss Mehitable B. Hubbard, shows a head well proportioned to the mighty trunk. The present widest expanse is eighty-five feet, and the height about one hundred feet. The most peculiar feature of the tree is a great table of irregular ridges or buttresses, spreading out some ten feet in all directions. At first thought it would seem that a change of grade in the road may have exposed the roots; "but," writes Miss Hubbard, "there has never been any disturbance of the surface near it, and the spreading roots are, as nature formed them, above the soil."

Several stunted barberry-bushes, springing from crevices amid these ridges, maintain a precarious existence. A currant-bush has secured a foothold in a

notch ten or a dozen feet higher, and this July of 1889 it is red with berries; and a currant-bush—whether the same or its ancestor—has been subsisting there for one hundred years. “The oldest inhabitants,” writes Mr. Leavitt Hubbard, “some of whom have been dead thirty or more years, told me that their fathers said this bush was in the tree when they were boys.” At about fifty feet from the ground a plant of the Nightshade family, *Solanum dulcamara*, has been growing for more than twenty years.

The tree is of the “forest primeval.” The farm on which the elm stands—now called the Hubbard farm—was first settled about 1678 by Ephraim Foster of Ipswich. In his time the tree was so large, an uncertain tradition runs, as to be thought difficult of removal, and the first house on the place was built under its spreading branches. The farm passed by direct heirship from father to son for seven generations. The place was never sold or deeded until 1873. The elm has figured more or less prominently in the history of the family during all this time. “The present frame-house—the third erected on the premises—was built in 1844; while the first house, which sufficed for Ephraim Foster, his wife, five daughters, and seven sons, is attached as a woodshed.”

Considering the present rugged strength and vitality of the Hubbard Elm, it is scarcely probable that it was over fifty years old in 1678. This estimate would make it two hundred and sixty-two years old to-day,—an age far transcending the average life of the elm.





THE BROOKS ELM, WEST MEDFORD.





THE BROOKS ELM.

THE Brooks Elm stands in the rear of the house of Francis Brooks, West Medford. It is a shapely tree of the vase type, with a fine head of foliage.

Its portrait is introduced here to show what may be expected of an elm, under not specially favorable conditions, at the age of one hundred years.

Girth at five feet	10 feet 2 inches.
Height	60 "
Spread	75 "

THE DEXTER ELM.

Why are there trees I never walk under but large and melodious thoughts descend upon me?

WALT WHITMAN.

THE present Dexter house stands at the corner of Elm and Dexter Streets, Malden, set back from the highway, and approached by an avenue flanked on either side by old and decrepit elms. Other trees there are, elm and apple, scattered over the lawn; but the eye, passing over these lesser growths, rests with delight upon the big elm, rising high above the dwelling-house, overtopping and outreaching the century-old saplings along the driveway. A great man may not be a hero to his valet, but a great tree gains by close acquaintance, and reveals the full measure of its greatness only to its intimate friends; and all the elements that make up arboreal greatness—girth of chest, height, and spread of limb—are present in the Dexter Elm. The trunk is massive, roughened with burls, clothed with deeply ridged bark, entire for thirteen feet, and then separating into three chief branches, which rise, slightly diverging, for thirty or forty feet, at which height they spread out at a wider angle, subdividing and forming a very noble head.

In July, 1882, it measured 18 feet 9 inches in circumference at five feet from the ground, was 85 feet in height, and spread 104 feet from northeast to southwest. In 1890 the girth at five feet was 19 feet 2 inches, and height 90 feet.

The Dexter estate is a notable example, for New England, of continuance in the same family and under the same family name. The original parchment deed, running from Edward Lane, merchant, of the jurisdiction of Massachusetts Bay, to Richard Dexter of Charlestown, and bearing date of Boston, Nov. 3, 1664, is recorded in the Registry of Deeds at Cambridge. The ownership has, accordingly, been vested in the Dexter family for two hundred and twenty-six years. It might be supposed that some chance mention of the great elm could be found in old letters or records, from which its approximate age and rate of growth could be authoritatively determined; but no such writing seems to be in existence. An unbroken tradition, however, runs back to Captain John Dexter, 1705-





THE DEXTER ELM, MALDEN.

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1790, who could not remember it as a young tree. As the first house on the present site was built when Captain Dexter was about fifteen years old, his impressions in old age with regard to a tree not one hundred feet from his front door must be accorded some weight. Accepting this tradition as trustworthy, the big tree cannot be less than two hundred years old. There is not much doubt that it was a thrifty young tree when the ink on the old parchment deed was still wet, and it has seen generations of Malden Dexters come and go, like the leaves of its own coronal.

The September gale of 1858, which blew down the Orthodox church in Malden, broke off a limb so huge that the wreckage was estimated by the cord; but kindly Nature has so symmetrically developed the tree that scarcely a trace of the loss is now to be seen.

There were, it is said, one hundred years ago, about the Dexter house, five of these big trees, of which the present elm is the only survivor. Its companion on the opposite side of the driveway perished perhaps seventy-five years ago. Another, whose hollow trunk could no longer be trusted to hold out its branches at arm's length, was cut down somewhat later. For the past fifty years the present elm has had no local rivals, and few superiors in the world of elms.

THE GREAT ELM, WESTFORD.

THIS noble elm stands in front of the residence of G. F. Dupee, a short distance from the Westford station, on the Stony Brook Railroad. The house is older than the tree; but whatever architectural impress of the colonial period it may once have borne, has been obliterated in successive remodellings.

The tree is said to have been set out by Isaac Cummings about the year 1700, and therefore must be at least 195 years old. No ancient deed or journal or letter so much as alludes to it during the first century of its existence; and though it has been locally called the "Great Tree" as far back as old men remember, it does not appear to have been widely known, escaping the researches of Emerson and the measuring-tape of Holmes.

Of late years, however, there have been many visitors, to the suggestion of one of whom is due the iron rod that securely binds together two great branches that were threatening to split asunder. It would be a pleasure to record the name of this unknown benefactor, who, perchance, has done more real good to his fellows, in this preservation of a tree, than scores of illustrious fighters who have spent their lives in the destruction of their species.

During the storm of Feb. 12, 1886, the tree was so heavily coated with ice that several large limbs were broken off, one of them yielding "over two hundred feet of plank." Notwithstanding these losses, it is still a symmetrical tree, of imposing aspect, and with few superiors.

Dimensions, August, 1882,—

Girth at two feet from ground	23 feet 7 inches.
Girth at five feet from ground	21 " 7 "

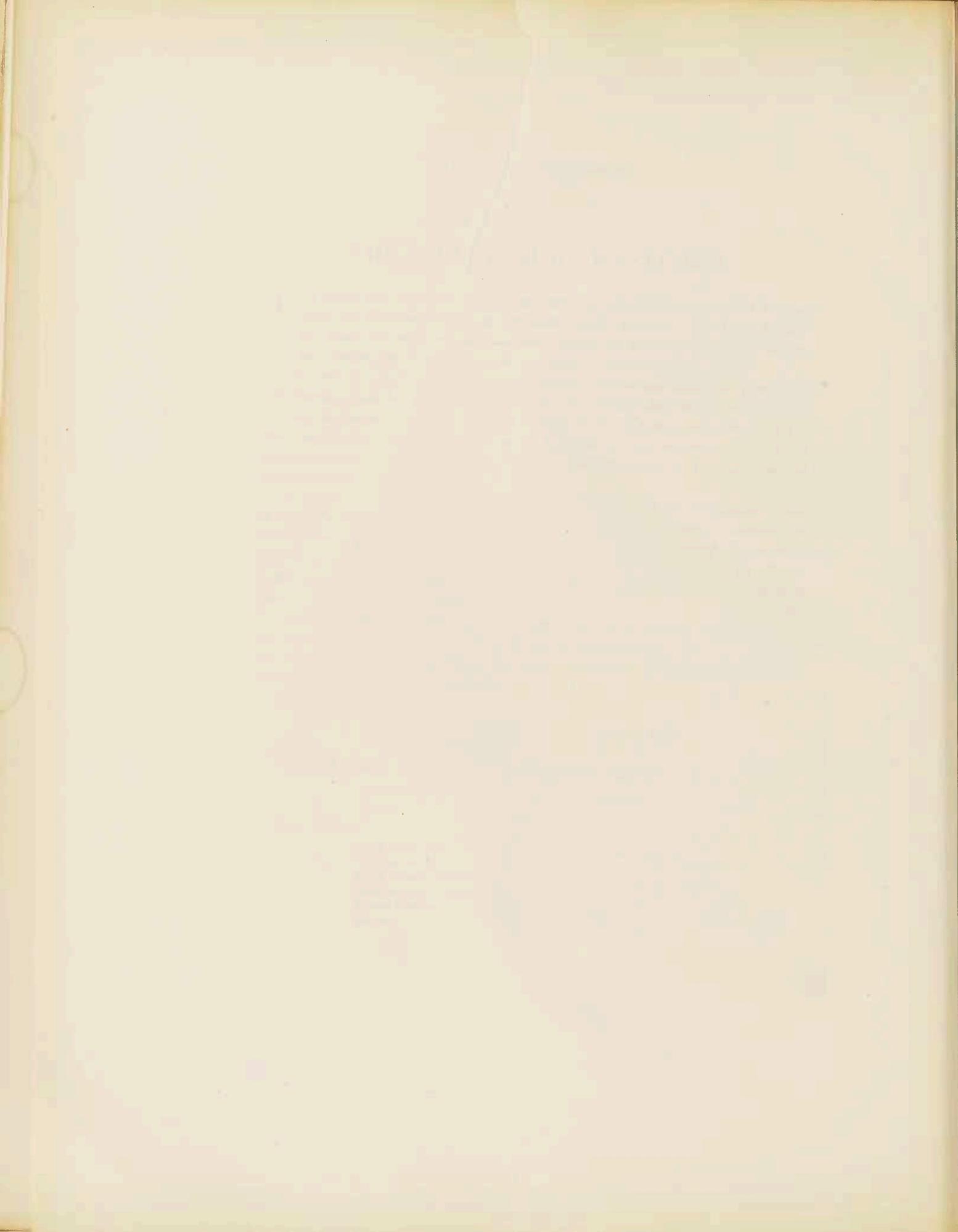
The trunk forks at about six feet from the ground. August, 1887,—

Girth at five feet	22 feet 3 inches.
Height	90 "

July, 1890,—

Girth at two feet	25 feet 8 inches.
Girth at five feet	22 " 5 "
Girth of north branch	16 " 7 "
Girth of south branch	14 " 3 "
Spread northeast to southwest	118 "
Height	90 "







THE WESTFORD ELM.



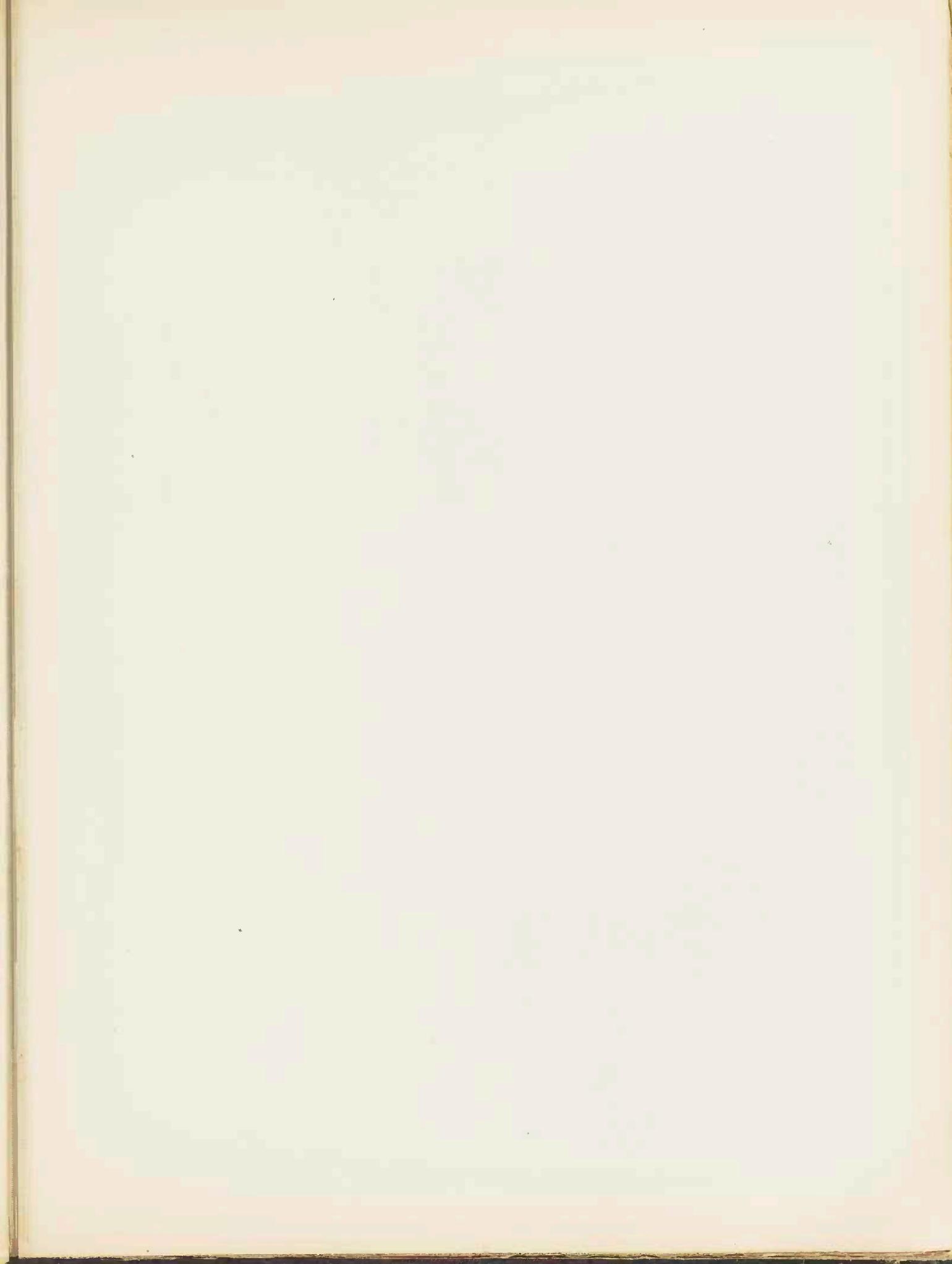




THE WILLARD ELM, DEERFIELD.

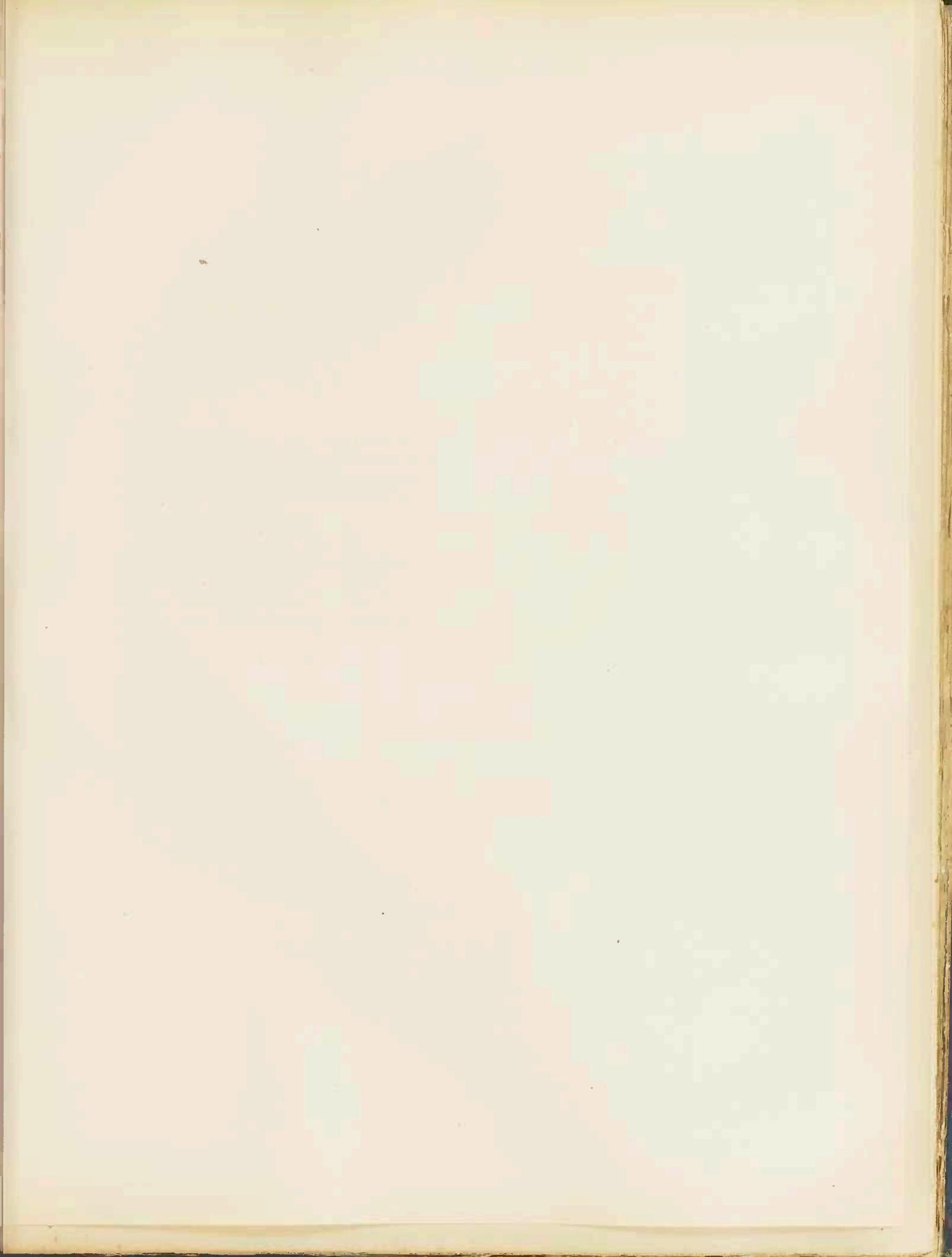








THE WILLARD ELM, DEERFIELD.





THE WILLARD ELM, DEERFIELD.

In the blood
Of our New World subduers linger yet
Hereditary feuds with trees. — LOWELL.

SUCH were not the early inhabitants of Deerfield. While they cut down the primeval forest to make room for the corn-field, they set out near their dwellings the maples and the elms, whose magnificent proportions are the pride of their descendants. The elm that stands on the lawn of the Willard house¹ is the largest, if not the tallest, of all these trees.

The house was built in 1768, in the best style of old colonial art. It has been confidently asserted that "the tree is much older than the house, and older even than the L, which is known to have been standing in 1704." This may well be the case, for the house, like a well-preserved matron, does not look half its years; while the tree, with all its stateliness, gives, in its ancient top, many a hint of approaching decrepitude.

During the Indian wars it stood within the line of fortifications, near the north-east corner of the enclosure. It may have been one of the native forest, as Deerfield was settled by the English as late as 1669 or 1670; but it is more probable that it was transplanted by an early resident.

In the absence of direct evidence, the last conjecture is reasonable. The size and present condition sanction an estimate of a hundred and seventy-five to two hundred years.

Dimensions, July, 1889, —

Girth at five feet	20 feet.
Height	85 "
Spread	117 "

¹ Now owned by Mrs. C. B. Yale.

FEATHERED ELM, LANCASTER.

THIS beautiful tree stands in the centre village, a short distance from the railway station, at the intersection of the Old Bay Path and the Bolton road, in front of the house of Caleb T. Symmes.

It is a remarkably fine example of the feathered elm. Like most trees of the type, the primary limbs have few large subdivisions, being clothed instead with the greatest profusion of short, delicate branchlets, which allow only occasional glimpses of the bark from the base of the trunk to the tips of the twigs. It is said to be the largest elm of its kind in the State.

Girth at five feet from the ground	15 feet 8 inches.
Height	85 "
Forks at about twenty feet.	







FEATHERED ELM, LANCASTER.





THE BIG ELM, LANCASTER.



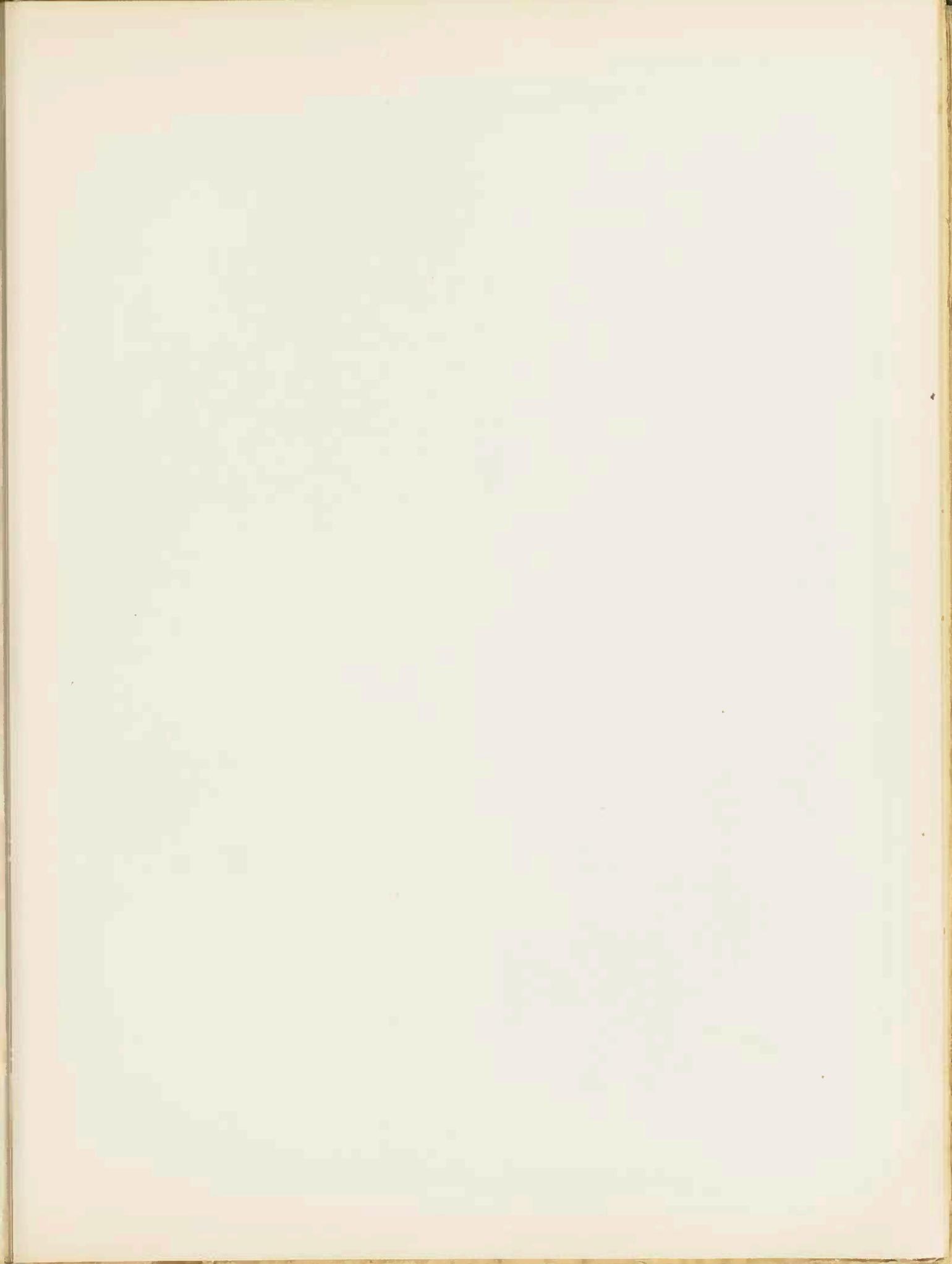




THE BIG ELM, LANCASTER.

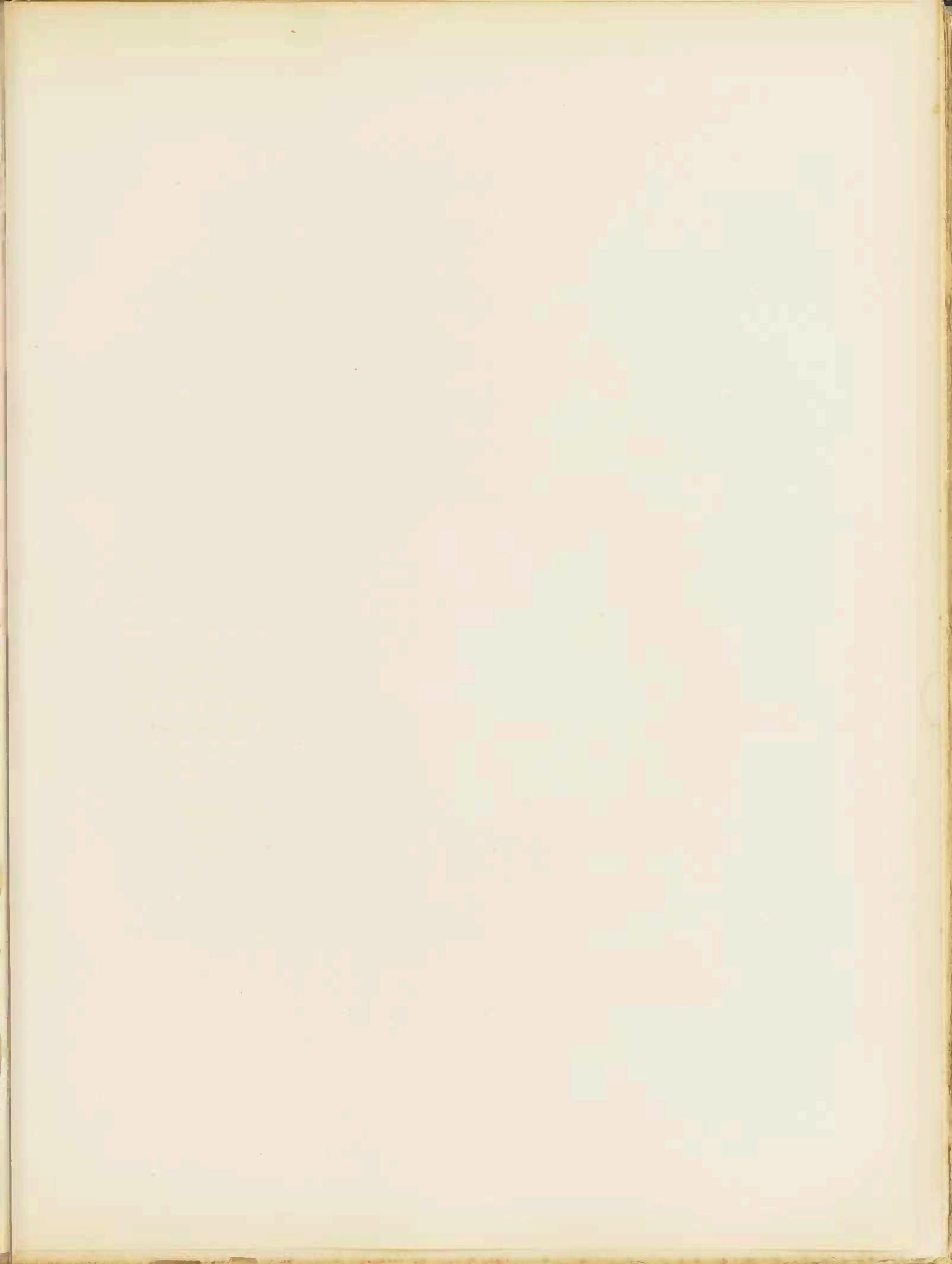








THE BIG ELM, LANCASTER.





THE GREAT ELM AT LANCASTER.

My root was spread out by the waters, and the dew lay all night upon my branch. — Job xxix. 19.

“**E**AST of Centre Bridge in Lancaster, on the south side of the river, by a green lane which was once a town road, a tree of 70 or 80 feet high measured 20 feet 9 inches at two feet above the bulging of the roots.” The tree thus cursorily noted by Emerson in 1845 is now easily chief among the celebrities figured in this volume. Of past worthies, the Johnston and Hatfield elms, so far as the reported measurements may be trusted, were certainly its inferiors. It may have been surpassed somewhat in girth by the “colossal Springfield Elm,” of which, so far as known to the writer, no pictorial likeness exists; it may have been rivalled in grandeur by the Andover Elm (see Plate X) when in its prime: but it is hard to conceive of a tree which combines in such magnificent proportions the leading characteristics of the American elm. It is of the vase type,—the form popularly associated with the elm, and under which it is usually figured and described.

Half a century ago there were in the vicinity, old people say, several other elms of approximately the same size; but no trace of them is now to be seen. The great tree stands in solitary state, its roots drawing generous sustenance from the deep soil of the Nashua intervalle. Perhaps as one approaches across the open field, the most noticeable feature is, first, the perfect symmetry of the head; and then, the curious manner in which several of the great branches, crossing each other, have grown immovably together, betokening swift growth and tranquil seasons while nature’s welding was going on. The extraordinary dimensions do not at first impress themselves upon the visitor, the more especially as there is neither house nor tree close at hand to serve as a unit of comparison; but when he has once made the circuit of the huge trunk, noted the mighty buttresses, the height and sweep of the arches, he feels that he is in the presence of a veritable monarch of the forest.

There is no direct evidence touching its age. In a township conspicuous for fine trees, it seems to have attracted no special attention. Standing indisputably

on its original site, the traditions that associate the planting of trees with the building of houses are, of course, wanting. Marvin's "History of Lancaster," published in 1880, has little to say of this particular tree. The precise point at which Emerson measured it is, unfortunately, too vaguely stated to admit of an exact determination of the rate of growth from that date to the present day; but the vigor with which it has grown since Emerson's time indicates vital powers that have not yet reached maturity. There is other evidence to the same effect: the trunk is perfectly sound; there are no dead limbs or twigs; there are no loose layers of bark such as are often seen in ancient trees.

The great elm, in all probability, is not over one hundred and seventy-five years old, and has before it another half century of life.

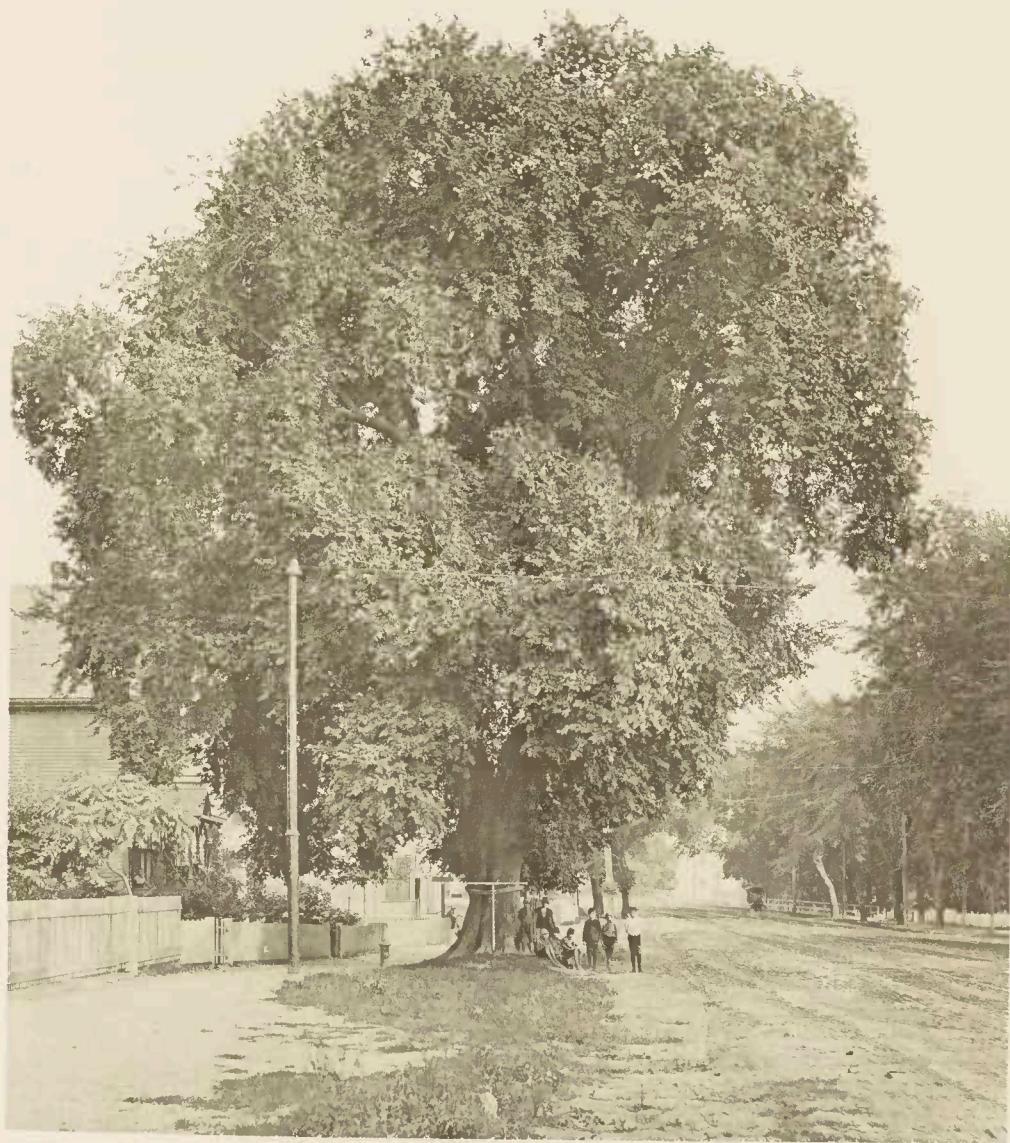
Its dimensions, June 9, 1888, were as follows:—

Girth on the upper side, five feet from ground	23 feet 5 inches.
Girth on the upper side seven feet from ground	24 feet
Spread from east to west	114 "
Height	95 "

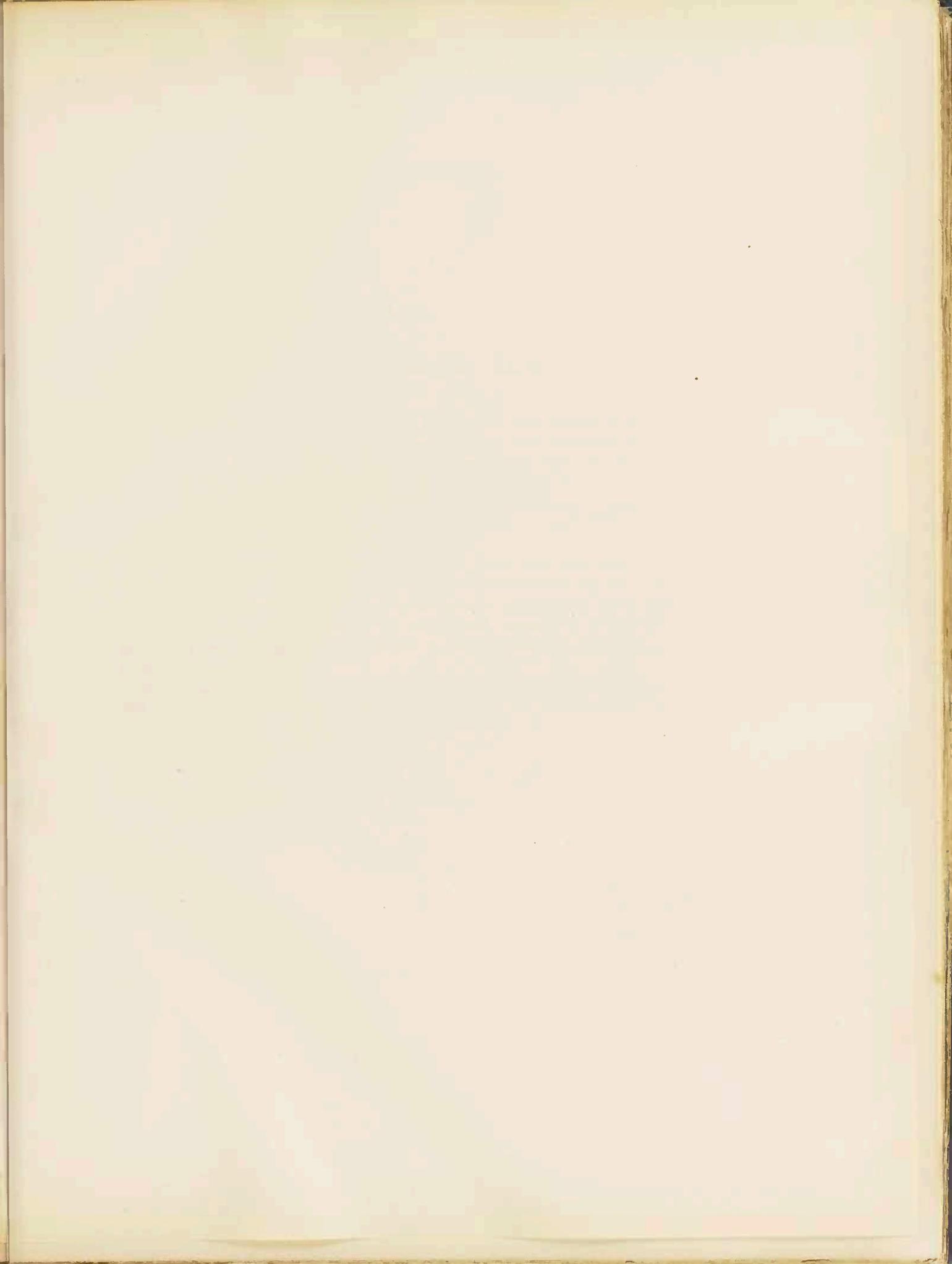
Dimensions taken April, 1890, by William C. Wendte:—

Girth at five feet from ground, on upper side	23 feet 6½ inches.
Girth at five feet from ground, on lower side	24 " 1½ "





THE WHITTEMORE ELM, ARLINGTON.





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THE WHITTEMORE ELM.

THIS tree stands on Arlington Avenue, Arlington, a short distance from the Cambridge line. It is said to have been set out in 1724 by Samuel Whittemore, in front of his house. This stout New England farmer knew as well how to defend his home as to adorn it, for fifty-one years later, though eighty years old, he took part in the battle of Lexington, and was left for dead by the wayside. He recovered, however, and lived to sit in the shade of the elm his own hand had planted, till the ripe age of one hundred and one.

When the avenue was widened in 1889, the tree, in the new plan, became an involuntary trespasser upon the highway, and was threatened with the axe. Its friends came promptly to the rescue, and plead its cause so eloquently that a stay of proceedings was granted, and the few feet of land necessary to its life were sequestered from the driveway and annexed to the sidewalk by a curving sweep of the curb-stone.

It is a goodly tree of the second class, conspicuous by its position, by comparison with its neighbors, and by the great mass of its foliage. It is still in a fair state of preservation, though evidently past its prime.

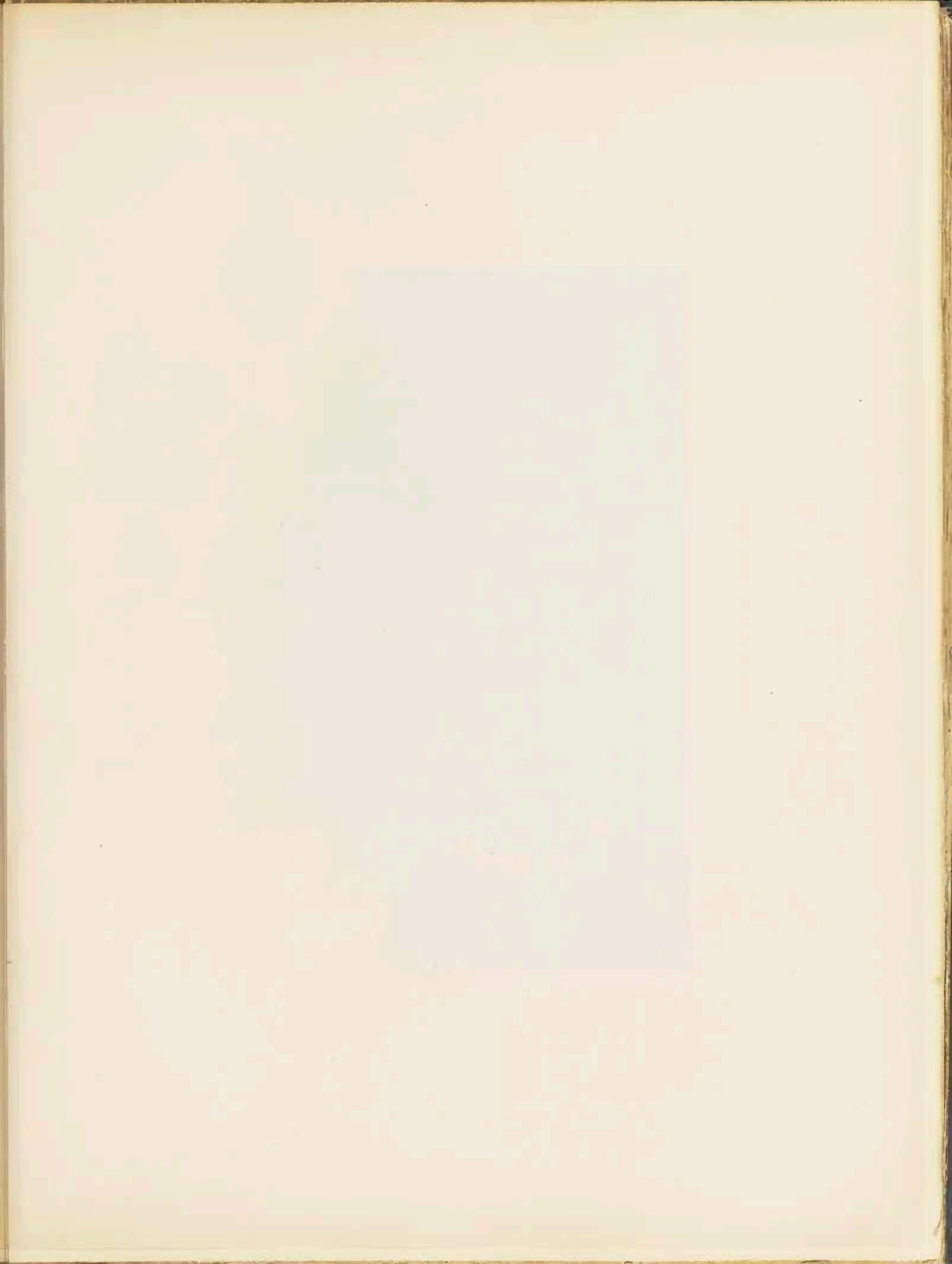
Circumference at five feet from ground	14 feet 3 inches.
Height	65 "
Greatest spread	60 "

THE STONE ELM.

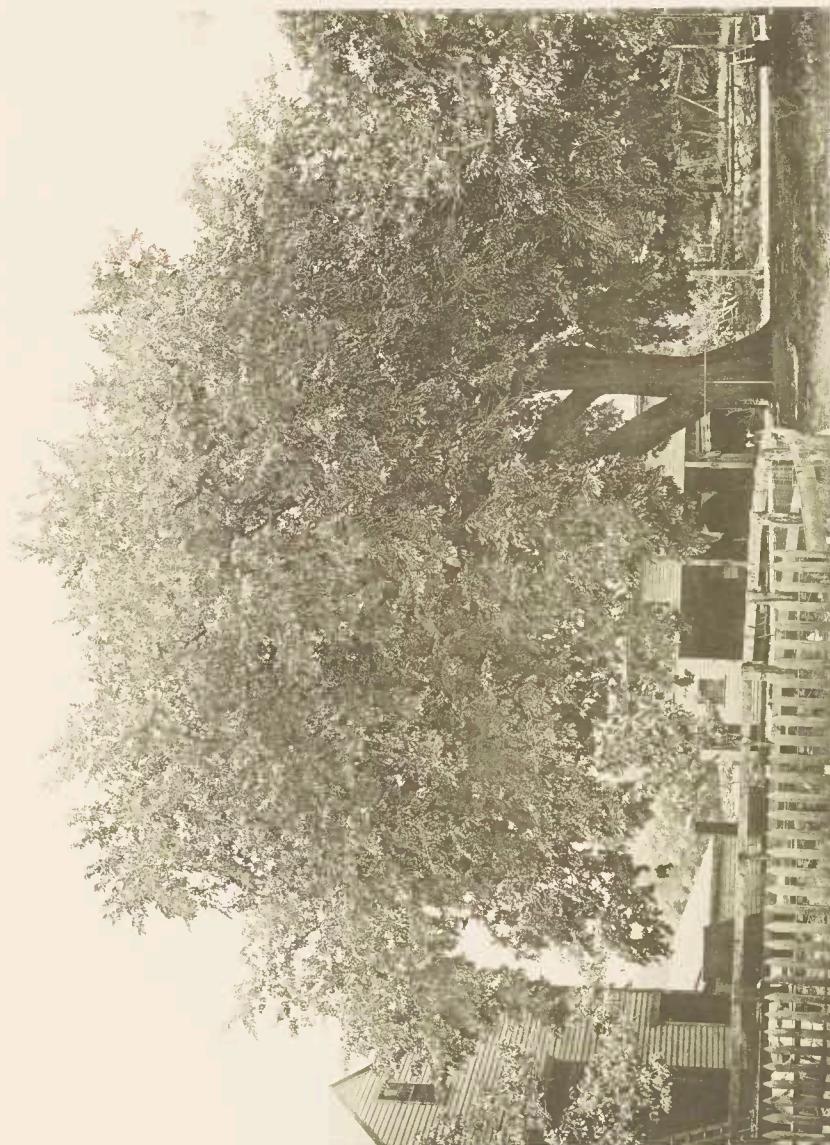
THE Stone Elm stands near the corner of Arlington and Grove Streets, in East Watertown, on the premises of Calvin Hoar. It is said to have been brought from Fresh Pond about 1763.

Though not of the first rank, it is introduced as a type of the low, broad-spreading elm. Its girth at five feet from the ground is 12 feet 10 inches; it forks at the height of eight feet, the larger division measuring, just above the point of furcation, 10 feet 10 inches in circumference, and the smaller, 8 feet 2 inches. The head is broad and full; the upper branches very tortuous, much like the top of an oak; the height about 60 feet, and the greatest spread (northeast to southwest) 100; the whole tree leans to the northwest. It is past its prime, having suffered severely from storms, and showing much dead wood, but is still a fine tree, making a vigorous annual growth.

It has not had the good fortune to be associated with any stirring historical event, having passed, like most trees and men, an uneventful existence. It has, however, served as a hitching-post time whereof the memory of man runneth not to the contrary, and successive generations of hooks and spikes are said to have been swallowed up in the expanding trunk.





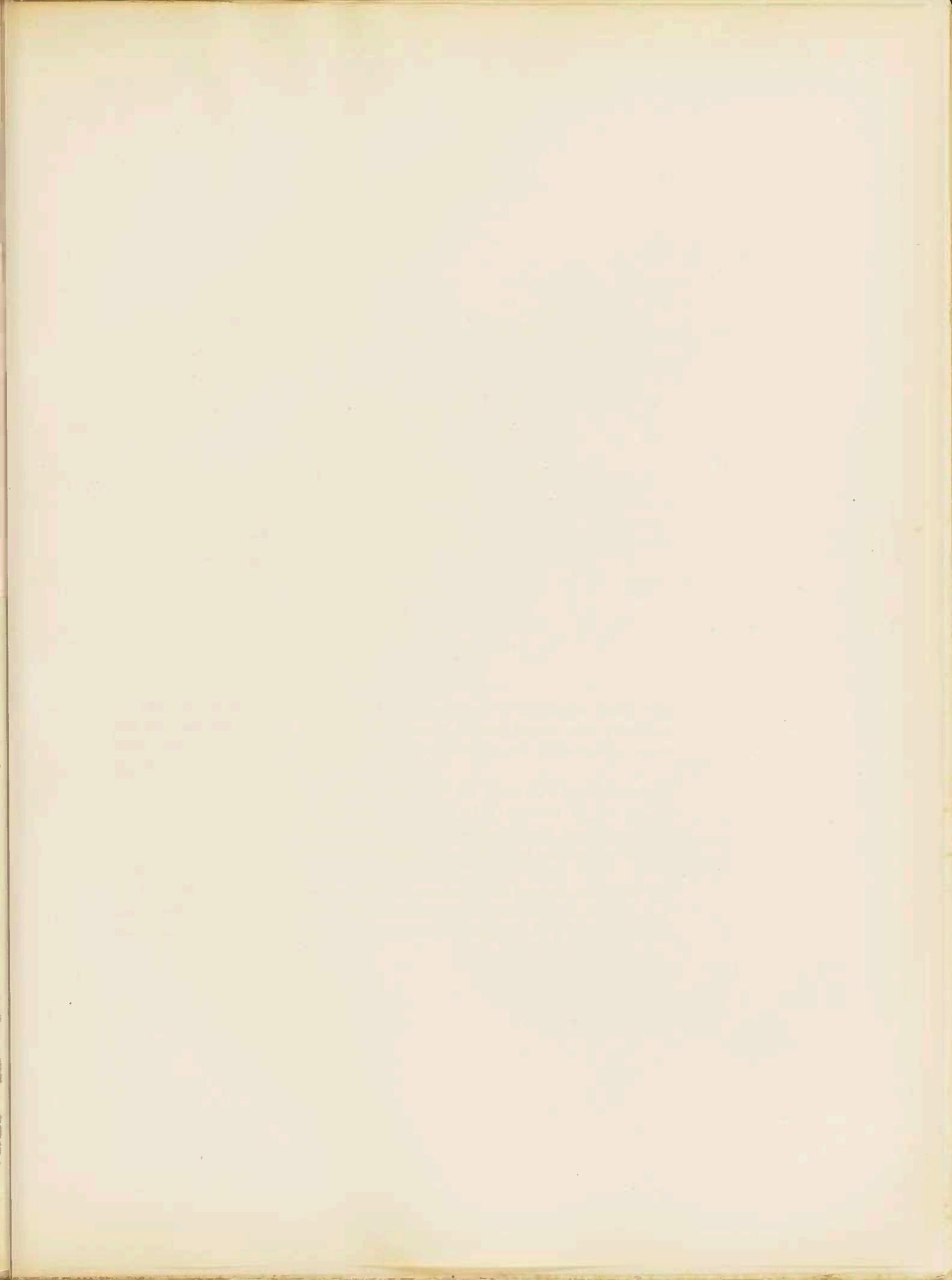


THE WATERTOWN ELM.





THE NEWBURY ELM.





THE OLD ELM OF NEWBURY.

Did it ever come in your way to pass
The silvery pond, with its fringe of grass,
And threading the lane hard by to see
The veteran elm of Newbury?

HANNAH GOULD.

THIS elm stands on Parker Street, in Old Newbury, in front of the house owned and occupied by William Jaques. The family legend runs that Richard Jaques, in 1713, pulled up four young elms growing near the home of his sweetheart, and set them out near his own residence. Three of them have disappeared, but the fourth has passed into local history.

“The twig took root; and as time flew by,
Its boughs spread wide, and its head grew high;
While the priest’s good service had long been done,
Which made the youth and the maiden one;
And their young scions arose and played
Around the tree in its leafy shade.”

The story of the elm is preserved in the traditions of the Jaques family, who still live upon the old site. It is said, too, that a Richard Jaques, each generation since, with a single lapse, has perpetuated the name of the Richard who reared this leafy monument to his love.

The tree grew on apace. In 1786, when the old house that had sheltered the young bride of Richard the first was torn down, and replaced by the present edifice, the elm, it may be presumed from the laws of elm-growth, was a lusty tree, and during the first quarter of the nineteenth century had attained its noblest proportions.

In 1838, according to Emerson, at the smallest place between the roots and the branches, it was fifteen feet in circumference. The massive trunk ran up some twelve feet, and then separated into four great branches, which, dividing and sub-

dividing again and again, formed enormous arches of green. In the days of its prime the height is said to have been about eighty-five feet, and the spread from east to west, ninety-six feet. The branches were feathered to their tips, and drooped till the cows browsed upon them on their way to and from the pasture.

The traveller still may pass—

“The silvery pond, with its fringe of grass,”

and thread the “lane” by which stands the veteran elm; but it is no longer the tree it was in Hannah Gould’s day. After the manner of elms approaching their two hundredth birthday, the evidences of its age are to be read in the dead branches here and there amid the leaves. These have been dying at their ends for years, and “cords of wood” fell in the ice-storm of 1885, reducing the height to about 75 feet, and the spread from east to west to 82 feet. On the 13th of June, 1890, the largest branch was torn off by the wind, about six feet from the roots. The fallen portion was 60 feet long, and measured 10 feet in girth at the point of separation; 14 feet higher up there were two limbs measuring respectively 7 feet, and 9 feet 6 inches. The head is still impressive, more picturesque, perhaps, than at its best; while the tape, circling the trunk at five feet, where the girth is least, marks a circumference of 17 feet 3 inches.

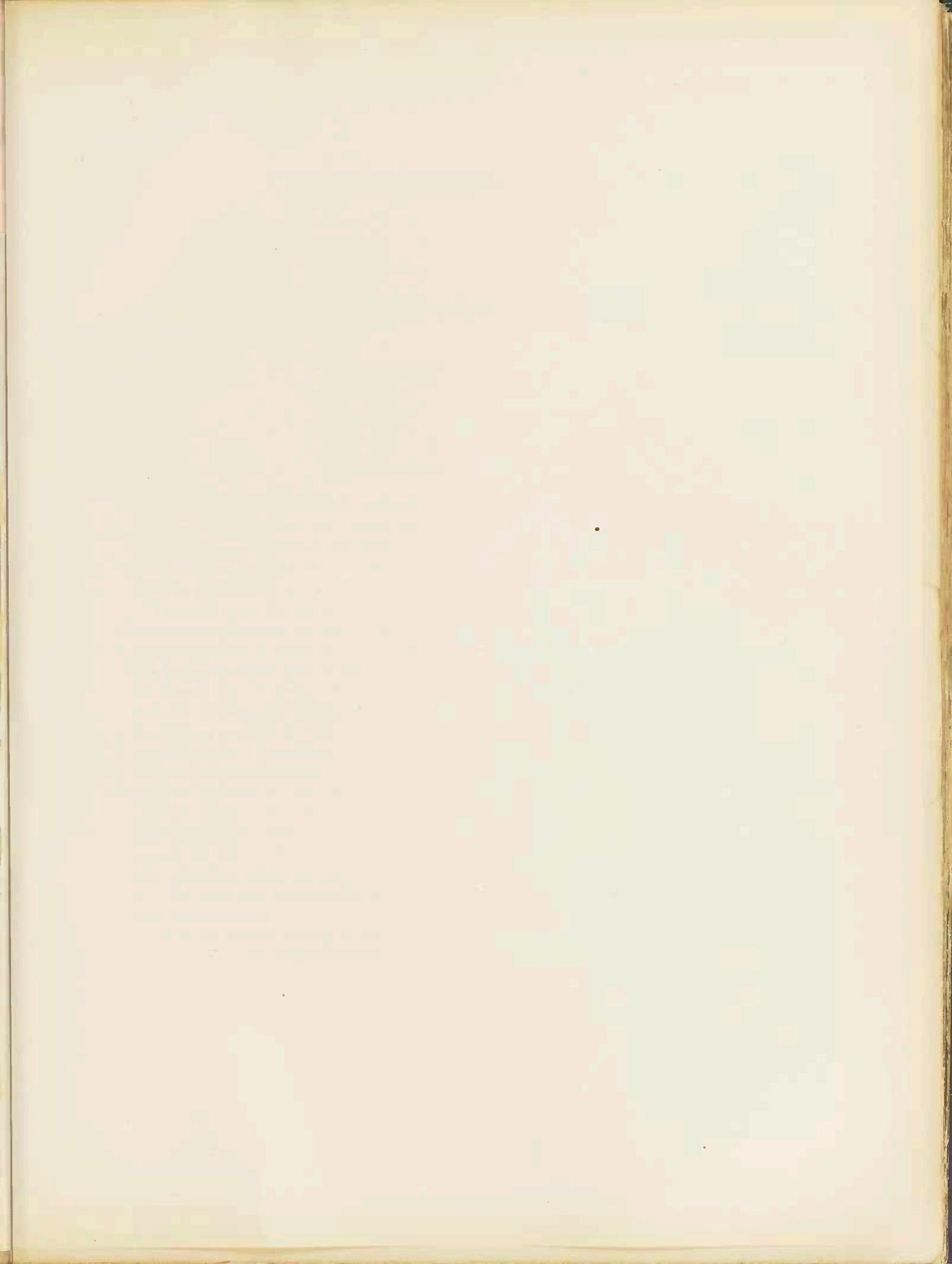


XXIV.



THE OLD ELM ON BOSTON COMMON.

FROM A PLATE BY J. W. BLACK.





THE GREAT TREE ON BOSTON COMMON.

The darkened skies, alas! have seen
Our monarch tree laid low,
And spread in ruins o'er the green,
But Nature struck the blow;
No scheming thrift its downfall planned,
It felt no edge of steel,
No soulless hireling raised his hand
The deadly stroke to deal.—HOLMES.

THE biographies in this volume deal with living trees; but an exception has been made in the case of the "Great Tree" on Boston Common, not because it was mighty above its fellows, for it has been outreached and overtopped by many elms elsewhere, but from its association with the early history of the city, and its intimate acquaintance with successive generations of Bostonians.

It stood near the centre of the Common, "in a rich hollow," its roots, doubtless, drinking of the waters of the Frog Pond, a few rods northward. Surprisingly little is known of its early history. On Captain John Bonner's map (the earliest complete plan of Boston), published in 1722, it was represented as the largest tree in town. In a map published during the administration of Governor Burnett, and bearing the date of 1729, it holds the same pre-eminence. In a picture wrought in 1755 by Miss Hannah Otis, a considerable cavity in the trunk is shown. Some thirty years later, on the testimony of Dr. J. C. Warren, "the tree bore strong marks of decrepitude and approaching dissolution." The aperture was now so large that "a boy eight or nine years old could creep into the cavity," and "the interior of the trunk was rotten, and much of it had disappeared." Early in the nineteenth century a successful effort was made to save the tree. "The edges of the aperture were protected by a mixture of clay and other substances, and the exterior covered by canvas fastened round it. The parts were regenerated, and the cavity, so far as could be ascertained, filled and obliterated."

From its isolated position, it suffered severely from storms. In 1825 it was still a beautiful and symmetrical tree, though it had lost the extremities of many

branches. In 1831 four large limbs were "so far detached that they rested on the ground." They were raised and bolted together, and the presence of the bolt-ends was, twenty-three years after, the only evidence of their separation. "The tree was again seriously dismembered in a storm, June 29, 1860." "One of the remaining large limbs fell" in the September gale of 1869. "Its final destruction took place Feb. 16, 1876, when it was broken off about a foot from the ground." Hundreds of citizens visited the spot on the next day, and secured portions of the fallen limbs. A chair made of its wood is now in the Boston Public Library.

DIMENSIONS AT VARIOUS TIMES.

In 1825.	Girth 21 feet 8 inches at 2½ feet from ground. Height 65 feet. Spread 86 feet.
In 1844 measured by George B. Emerson and Asa Gray :	
	At ground, girth 23 feet 6 inches. At 5 feet above, 16 feet 1 inch. Largest branch stretches towards the southeast 51 feet.
In 1855.	Height 72½ feet.
In 1860.	Girth, at 1 foot above ground 22 feet 6 inches. " 4 feet " " 17 " " 5 " " " 16 " 6 "

It is said to have been originally of a drooping habit, every trace of which, however, had disappeared when the accompanying portrait was taken.

Its age has been variously given. The Boston "Commercial Gazette," April 25, 1825, published a communication stating that Captain Daniel Henchman, an ancestor of Governor Hancock, planted this tree about 1670, to shelter the Ancient and Honorable Artillery Company during their parades on the Common. The Henchman story was adopted by Dr. Gray in his article on the "Longevity of Trees," "North American Review," July, 1844, and has often been repeated in notices of the elm. In a monograph on the elm, 1855, Dr. J. C. Warren critically examined the Henchman claims, and subsequent investigation goes far to sustain the results he arrived at. Basing his reasoning upon the average annual growth of the American elm, he concluded "that the growth between 1670 and 1722, a period of fifty-two years, could not have entitled the Great Tree, so called, to the conspicuous representation it has on Bonner's map." Nor is it probable that an elm only eighty-five years old would exhibit marks of decrepitude. The statement is made (Jesse Lee and the Old Elm) that when the largest branch was broken off, in 1860, the rings were carefully counted, and

found to be more than one hundred and ninety, "and when the tree fell, that the largest surviving limb had one hundred and ninety-nine rings." Admitting this evidence, the tree, though assuredly planted prior to 1670, may not date back earlier than 1640-1650. It does not seem to be safe to accept as well grounded the "belief" that it antedated the settlement of Boston, and was the last living memorial of Indian Shawmut.

It has been strangely confounded with "Liberty Tree," which stood at or near the corner of what are now Washington and Essex Streets, and which was cut down by a party of British, in August, 1775, making fourteen cords of wood. This tree, too, was usually called the "Great Tree," and played a prominent, though passive, part in the lively politics of the period.

An atmosphere of tradition envelopes it. Whatever took place anywhere on the Common has gravitated into the history of the big elm. There is no evidence that in 1676 old Matoonas was "shot to death" beneath its branches by Sagamore John and his followers. There is no certainty, scarcely probability, that the Quaker martyrs were hanged thereon. "I suppose" ("New England Judged," pp. 235, 236) "a branch of a tree was the gallows, perhaps the Great Tree." Nor is it at all certain that "a fatal duel took place *under this tree* on July 3, 1728." The body of young Woodbridge was found near the Powder-house, presumably on the spot of the duel. His monument "is still to be seen in the Granary Burying-ground."

As we approach the Revolutionary era the atmosphere grows clearer. A British army encamped about the Great Tree, and suffering the severity of a New England winter, threatened it with destruction. Boston has a warm place in its heart for General Gage, who withheld the sacrilegious axe. In 1812 the life of the tree was again brought into peril by the little army encamped about it for the defence of the town. On the 20th of September, 1740, an audience of eight thousand people gathered about the old elm to listen to the eloquence of George Whitefield. Beneath its branches, upon the 11th of July, 1790, Jesse Lee preached the sermon which marked the permanent establishment of Methodism in Boston. The centennial celebration of the event was held the current year upon the spot where the ancient tree used to stand. The stigma of serving as a veritable gallows cannot be branded upon it, but there is overwhelming evidence that bloodless effigies often dangled from its branches, or were consumed beneath them. These delicate attentions, in colonial times reserved for officers of the Crown or their sympathizers, were, after the Revolution, bestowed with

equal ardor upon unpopular politicians. The Great Tree witnessed many tumultuous scenes on the annual recurrence of election and Independence days, when party spirit, fomented by New England rum, the use of which was as yet unrestrained by public opinion or legal enactments, found vent in loud harangues and violent altercations. The patriots of those days were somewhat free in the use of tar and feathers; and the guardians of the public peace appear to have been discreetly blind to the antics of youthful Freedom.

One element of the picturesque passed out of the life of the tree in 1830,—“cattell” ceased to graze upon the Common; but it still continued to be used as a “trayning field” for the militia. The old tree witnessed many a goodly display of the boys in blue during the Great Rebellion; but, it is probable, magnifying the past, like most ancient people, it whispered, with every breath of air through its branches, the story of multitudinous redcoats routed by squads of ragged Continentals.

Its latter days were days of pleasantness and peace. About it had grown up a great city, the rulers whereof did it honor. Staid citizens came to view it by day, and vagrants slept beneath it by night. It looked down upon hucksters’ stands, the big telescope, and a poor exotic Punch and Judy; it looked up at the gilded dome; it looked over the rising generation of trees, that were never, how long soever their lives might be prolonged, to know the stirring days of ’76.

Its history is well epitomized in the two inscriptions upon the enclosure where it stood.

I.

THE OLD ELM.

THIS TREE HAS BEEN STANDING
HERE FOR AN UNKNOWN PERIOD.
IT IS BELIEVED TO HAVE EXISTED
BEFORE THE SETTLEMENT OF BOSTON,
BEING FULLY GROWN IN 1722, EXHIBITED
MARKS OF OLD AGE IN 1792, AND
WAS NEARLY DESTROYED BY A STORM
IN 1832. PROTECTED BY AN IRON
ENCLOSURE IN 1854.
J. V. C. SMITH, MAYOR.

II.

THE OLD ELM
DESTROYED BY A
GALE FEB. 15, 1876.

—
THIS ELM
PLANTED A. D. 1876.



THE CUNNINGHAM MAPLE, LANCASTER.





THE CUNNINGHAM MAPLE, LANCASTER.

ACER SACCHARINUM, WANG.

Yon maple, like the bush of Horeb,
Burns unconsumed; a white, cold fire
Rays out from every grassy spire.—WHITTIER.

A FINE rock-maple stands in Cunningham's meadow, on the east side of the Nashua River. Nothing can be ascertained of its history; but a comparison with the Deerfield maples, whose ages are known, and whose advantages of soil and surroundings are not widely dissimilar, points to a century as a reasonable estimate of its age. The dead wood here and there in the top shows that it is past its prime.

Girth at five feet from ground 12 feet 6 inches.
Branches at fifteen feet.
Height sixty to sixty-five feet.

Fifteen or twenty rods northward there is a companion maple, dead at the top.

Girth at five feet 11 feet 3 inches.
Height about sixty feet.

THE TAYLOR ROCK-MAPLE, SUNDERLAND.

ACER SACCHARINUM, WANG.

THIS tree stands on the south side of the house owned by Elias Leach, and is a thrifty young neighbor of the Big Buttonwood. It is said to have been set out by the Rev. Mr. Taylor, a former owner of the Leach house, and to be now about ninety years old.

Girth at five feet from ground	11 feet 8 inches.
Height	70 "
Spread	50 "





THE TAYLOR MAPLE, SUNDERLAND





THE CHURCH MAPLE, SUNDERLAND.





THE CHURCH MAPLE.

ACER SACCHARINUM, WANG.

ON Main Street, Sunderland, there is a little old-fashioned building, dating back a century, known as the Church house, but now no longer used as a dwelling.

In front stands the Church Rock-Maple, not as large as some, but as fine a type of the rock-maple still in full vigor as may be found in many days' wanderings amid their favorite haunts.

It was planted about eighty years ago, with other street trees. None of these maples appear to have been tapped.

Girth at five feet from the ground	8 feet 8 inches.
Height	70 "

THE BATCHELDER PINE, NORTH READING.

PINUS STROBUS, L.

I saw, far off, the dark top of a pine,
Look like a cloud,—a slender stem, the tie
That bound it to its native earth.—WORDSWORTH.

THIS tree stands in an open pasture on the west side of the old Andover turnpike, an eighth of a mile from the Andover line. When its companions—the stumps of which appear on every side—were cut down, Dennis Batchelder spared this tree because it was the largest among them,—a stretch of sentiment quite unusual among the owners of merchantable pine.

It is perfectly sound, but long past its prime; its age is unknown. At five feet from the ground its girth is 13 feet 7 inches; it does not taper much for thirty feet, and rises to the height of ninety-five feet.

“The Conqueror” will, however, probably

be the first to be published.

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THE BATCHELDER PINE, NORTH READING.



THE LYMAN PINE, WALTHAM.

THE LYMAN PINE, WALTHAM.

PINUS STROBUS, L.

Sigh with me, pine that never changed!
Thou wear'st the summer's hue;
Her other loves are all estranged,
But thou and I are true.—BAYARD TAYLOR.

THE Lyman Pine stands northeast of the house of Arthur T. Lyman, at the foot of a rocky hill, where it was probably standing in 1793, when Theodore Lyman first bought the Waltham estate. This view, based on the size of the tree, is strengthened by the consideration that Mr. Lyman made not much, if any, change of grade in its immediate neighborhood, and that he largely left the natural growth wherever possible.

The age can only be approximated by a comparison with other pines that have had as good a chance for getting food and water, and whose ages are known.

Girth at five feet from ground	12 feet 2 inches.
Height	85 "

THE "BULL-PINE" OF BOXFORD.

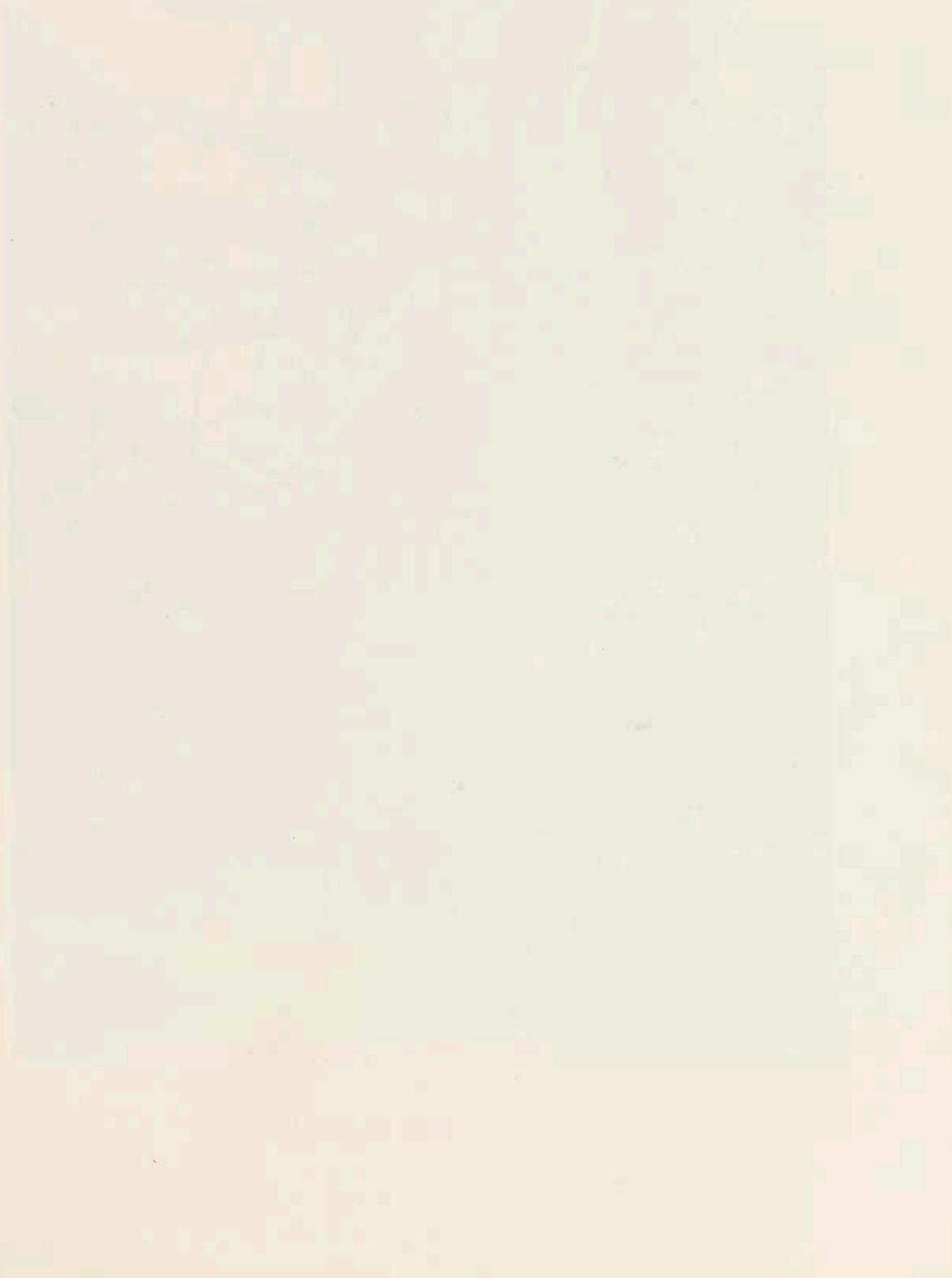
PINUS STROBUS, L.

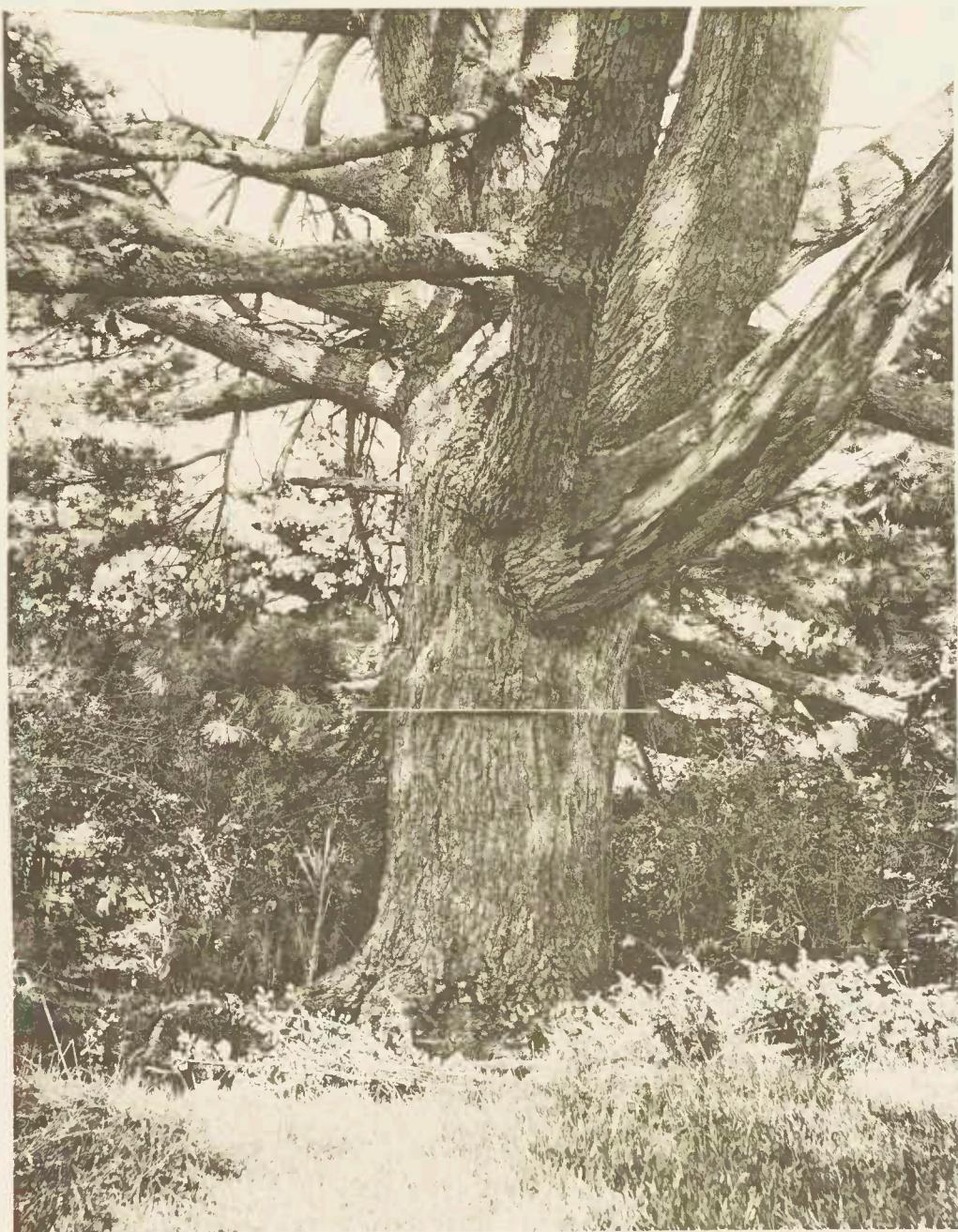
BALD HILL rises in the centre of the great woodland region lying within the limits of Boxford, Middleton, and Andover. From the old orchard at the crest of the hill the eye roams over a wilderness, not twenty miles from Boston, traversed by woodland paths, and diversified by watercourses. A vigorous second growth creeps up from the valleys and clambers over the gentle swells. Eastward, on the skirts of a marshy bit of land, a few maples and oaks and an ancient hemlock are the representatives of an earlier growth; westward, near the boundary line between Boxford and Middleton, stands, towering above its neighbors, the last survivor of the tall pines once common in the vicinity. One marvels by what grace it escaped the saw-mills which vex the streams of Essex, and lived through the days when ships were still built in Massachusetts. One pictures the sturdy wielder of the wasteful axe withholding the fatal stroke from sentiment pure and simple; but as he draws near the tree, the yeoman of the imagination recedes, and as he stands beneath it, vanishes into thin air. It is not the typical white pine of the United States, rising in a single shaft "of arrowy straightness, free from limbs," for a hundred feet or more. It is the despised "bull-pine" of the rural districts, branching a few feet from the ground, and worthless for masts and lumber. This is the kind of pine the thrifty New England farmer has left.

How insignificant the causes that shape the destinies of trees and men! Had not some worm of early colonial days nipped the terminal bud, or some bewitched cow from Danvers bitten off the top, it would long since have shared the fate of the straight-bodied, aspiring companions of its youth. Denied their upward career, it has turned the strength of its nature into the development of its branches, forming a broad head of great beauty. Smitten by lightning and shattered by storms, standing guard, as it were, over its own wreckage, it is a stately figure in the landscape.

From no point, unfortunately, could a view be obtained of the tree as a whole.

Girth at five feet on the south side	11 feet 10 inches.
" " " " north "	12 " 5 "
General branching at	7 "
Height	70 "
Present spread, east to west	80 "





PASTURE PINE, BOXFORD.

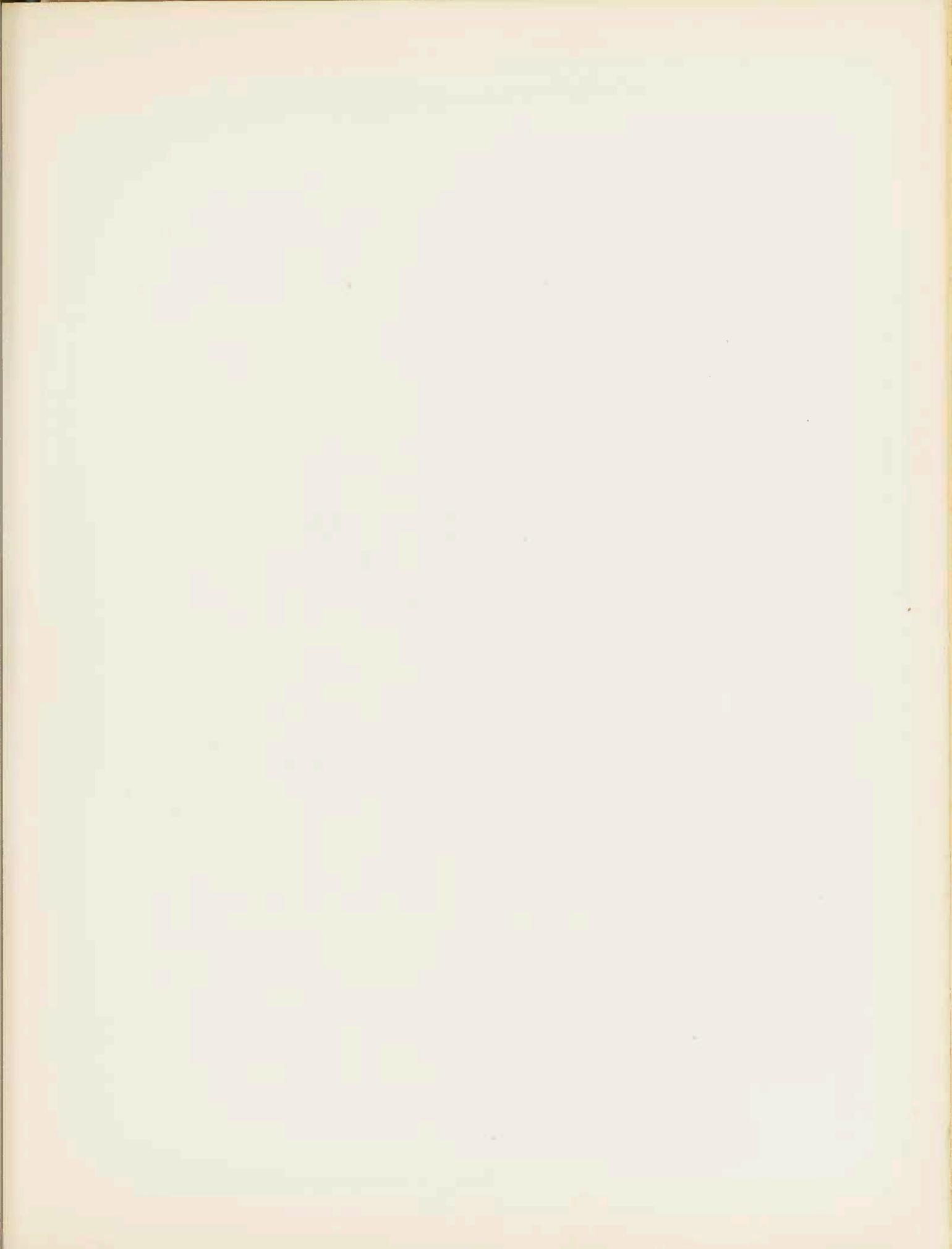




THE BIG BUTTONWOOD, SUNDERLAND.









THE BIG BUTTONWOOD, SUNDERLAND.





THE BIG BUTTONWOOD.

PLATANUS OCCIDENTALIS, L.

Totas amplexa Penates
Stat platanus.—MARTIAL.

SUNDERLAND lays claim to the largest buttonwood in the State. While this assertion is liable to be disproved by new aspirants from the country districts, it is thus far the largest reported; and while it is not to be compared with the enormous buttonwoods discovered by the elder and younger Michaux in the Ohio valley, it can safely appropriate the descriptive "big." It is larger than any of the Massachusetts buttonwoods mentioned by Emerson in 1846, most of which have since fallen. It stands near the house owned by Elias Leach, and towers far above it, looking down from the heights upon its neighbor on the opposite side of the house, the great rock-maple. Its age can only be conjectured. Extraordinary cases of rapid growth have been cited by Loudon and others; but this tree was so large one hundred years ago, tradition runs, that the train-bands were summoned to meet under the "big sycamore." This would imply a hundred years of previous existence.

Comparisons of trees under different conditions, or in different localities, must be made with great caution; but there seems to be no reason why this buttonwood should have grown more rapidly than the Charlemont Buttonwood (Plate XXXIII), which cannot be less than two hundred years old: as the Sunderland tree has a much greater girth, it is presumably older; the local estimate of three hundred years is not unreasonable.

Girth at five feet from the ground, lower side	23 feet 1 inch.
Girth at five feet from the ground, upper side	19 " 7 inches.
Separates at twenty-five feet into four large limbs.	
Spread about ninety feet.	
Height one hundred and ten feet.	

THE RICE BUTTONWOOD.

PLANTANUS OCCIDENTALIS, L.

Thus was he fair in his greatness, in the length of his branches, for his roots were by great waters. — EZEKIEL.

THE Rice Buttonwood stands in the town of Charlemont, about eight miles from the Hoosac tunnel. It is on the left bank of the Deerfield River, in front of the house of L. W. Warner, nearly opposite the Fitchburg Railway Station.

It is appropriately named for Captain Moses Rice, the first white inhabitant of what is now Charlemont, and who passed the nights beneath its branches until he had built a house for his family. This was probably in 1741, though the main body of settlers, guided through the wilderness by blazed trees, came from Deerfield in 1742.

The murder of Captain Rice by the Indians is recorded upon a monument which stands back of the tree, half way up the hill.

The reputation of the Rice Buttonwood does not rest wholly upon historical associations. It is a fine representative tree, of fair proportions, and well situated for pictorial effect.

Girth at five feet from ground	14 feet 11 inches.
Greatest spread	86 "
Height	105 "

The peculiar mottled aspect caused by the flaking of the bark in irregular patches, and the exposure of the inner layers, is especially noticeable. A cool stream of water gushing up near by runs into a trough beneath its branches; the river flows at its foot, and Peak Mountain rises in the background.

Little seems to be known of the limits of life of the buttonwood; the hints this tree affords are valuable. It is reasonable to suppose that it had a broad, dense head in 1741, else it would not have been chosen for shelter. It could not have been less than fifty years old at that date, and even this moderate estimate makes its present age about two hundred. It is probably twenty-five to fifty years older.

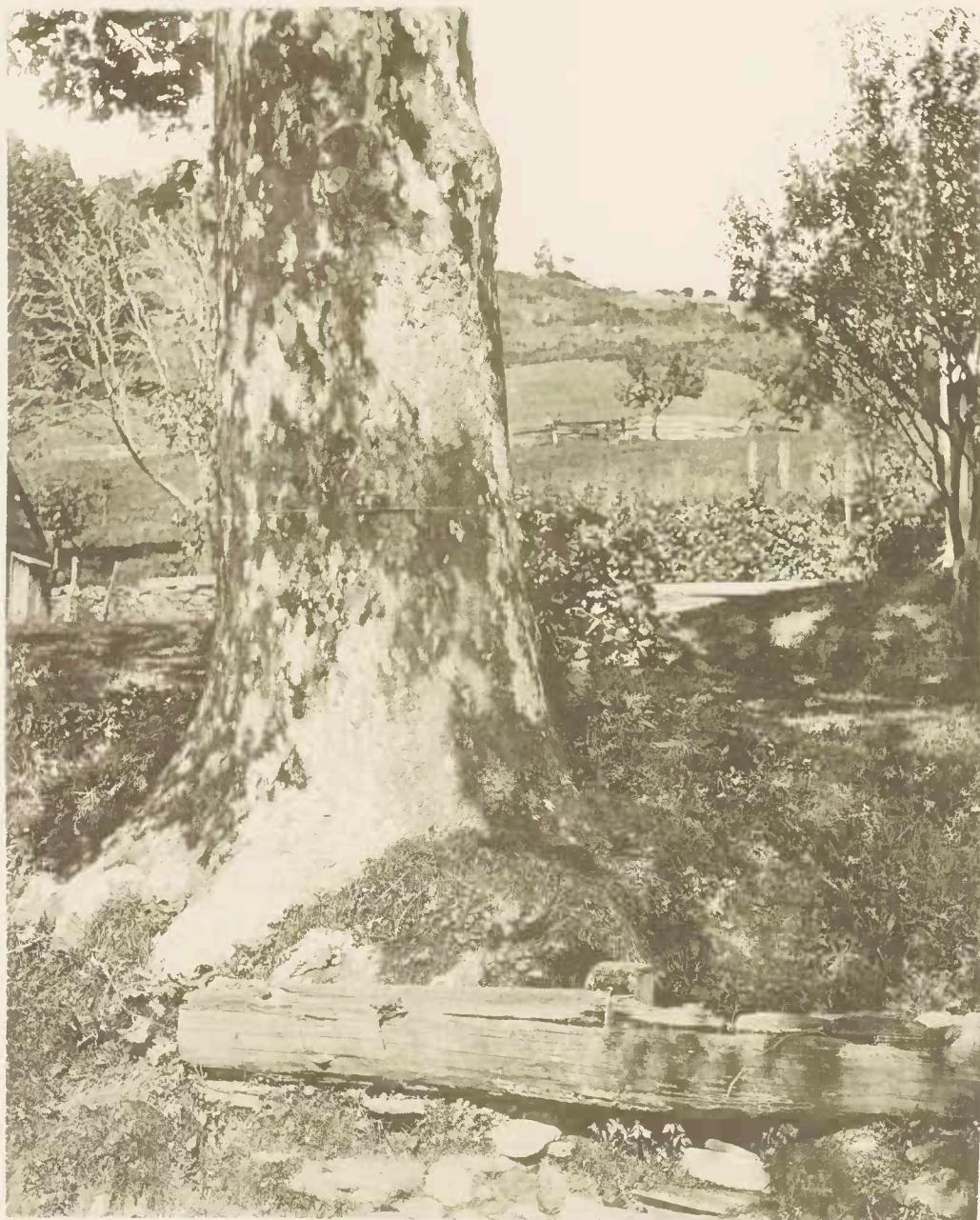


THE RICE BUTTONWOOD, CHARLEMONT.









THE RICE BUTTONWOOD, CHARLEMONT.

卷之三



A TOPSFIELD HICKORY.





A TOPSFIELD HICKORY.

CARYA ALBA, NUTT.

THIS fine shagbark is found on the continuation of North Street, Danvers, about half a mile south of the Ipswich River. It stands a little beyond the wall, in a pasture on the east side of the road.

Its size is not extraordinary, but it is a good representative tree, in perfect condition.

Girth at five feet from ground	6 feet 9 inches.
Height	60 "

THE MYSTIC HICKORY, WEST MEDFORD.

CARYA ALBA, NUTT.

THIS shagbark is one of a group of four, standing near the place where Mystic River issues from Mystic Lower Pond.

According to a family tradition, on the 19th of April, 1775, Peter C. Brooks, then a boy, attracted by the sound of guns and the gleaming of gun-barrels, and supposing the Yankees were out for muster, started on the run for Menotomy (now Arlington), but was overtaken under one of these hickories by a slave named Pomp, with the news of the British raid. If this can be admitted as evidence, these trees must be over one hundred and fifty years old.

Girth of the tree figured, at five feet from the ground	7 feet 5 inches.
Spread	62 "
Height	67 "





THE MYSTIC HICKORY.

卷之三





THE CLARK ASH, BELMONT.





THE CLARK ASH.

FRAXINUS AMERICANA, L.

THIS tree stands on the Clark estate, in Belmont, on the westerly side of Common Street, but a few rods distant from the railway station. It is somewhat obscured by its surroundings, being directly in the rear of the house erected by Thomas Clark in 1760, and its broad top has a background of trees and hillside.

From information given by Miss Sarah Clark, who now resides on the premises, it is believed to be upwards of one hundred years old. Her statement rests upon the authority of her father, Peter Clark, born in this locality in 1769, who used to say it sprang from the seed in its present site, and had been there as long as he could remember.

At five feet from the ground it measures 13 feet $6\frac{1}{2}$ inches in circumference, and the trunk maintains a nearly uniform size until, at the height of about thirteen feet, it separates into two great, freely subdividing branches. The height is 75 feet, and the greatest spread 80 feet.

The old tree is a fine specimen of the white ash, and gives the impression of great strength and sturdiness, despite the evidences of decay now visible. Some of the branches are dead at the extremities, and an ominous seam runs down the middle of the trunk.

The presence of walnuts, deftly wedged between the ridges of bark, leads one to look for the abode of the thrifty squirrel; and above we see his portals,—front and back entrances, one Norman, the other Gothic.

Belmont, but a few minutes' ride from Boston, furnishes worthy specimens of the two best known hard-wood trees; and as many pilgrimages to remote points have been necessary in the preparation of this book, we are fortunate in being able to join in the refrain of the North Country maid,—

“Oh! the oak and the ash and the bonny ivy-tree,
They flourish at home in my own countree.”

A GROUP OF TUPELOES, WEST MEDFORD.

NYSSA SYLVATICA, MARSH.

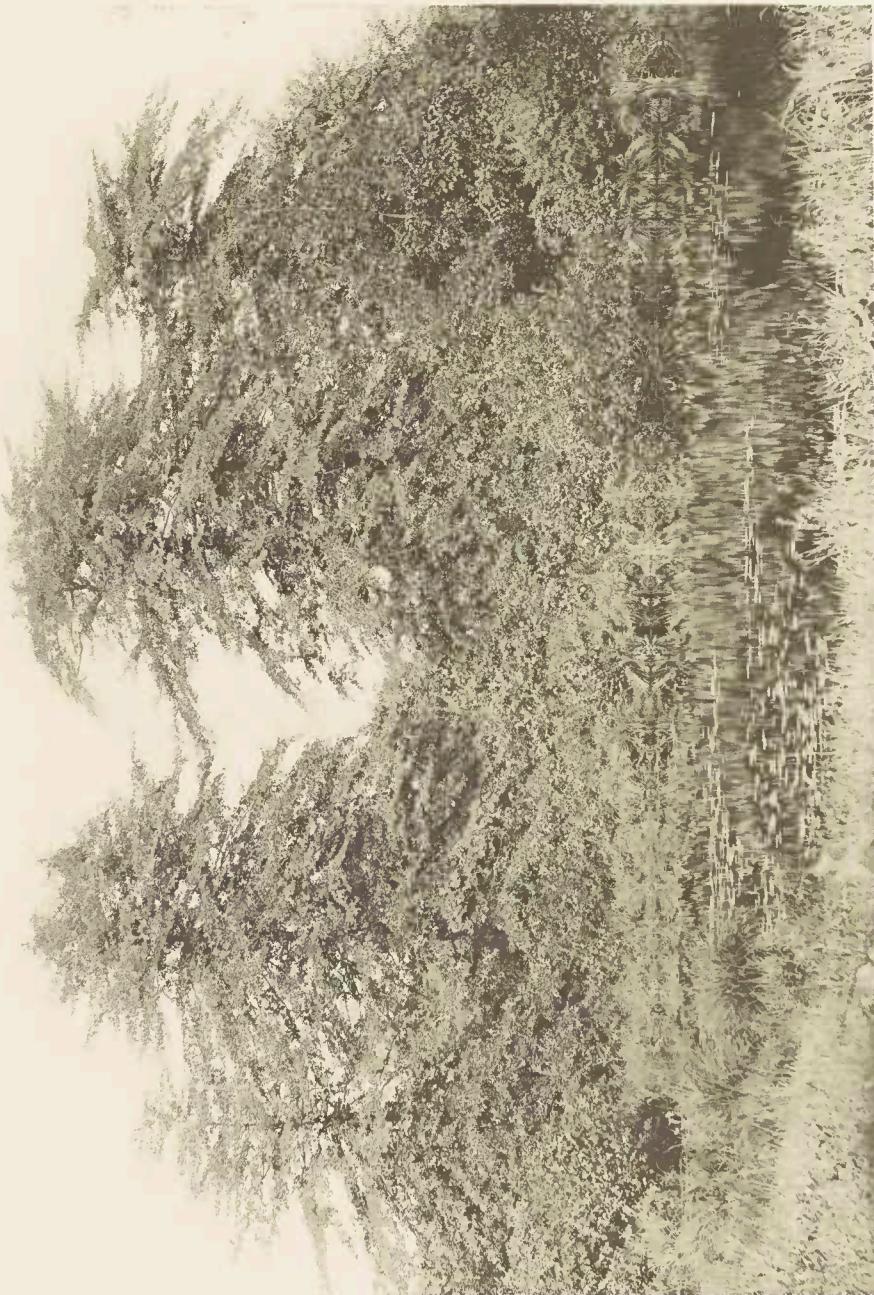
LARGER trees of this genus are not uncommon within our limits, though the highest development is to be looked for farther south. The value of the tupelo as an ornamental tree is admirably shown in the group chosen for illustration. The trees that compose it grow naturally upon the margin of a pasture pond in the estate of Shepherd Brooks. Their habit in the open is here seen at its best in the spring,—the branches irregular, thickly set, and gently sloping, the tips of the lower lost to view in a profusion of low shrubs and clumps of meadow grass. In summer the leaves are of a brilliant green, reflecting the sun's rays at myriad angles; and in autumn they light up the browns of the sedges and the dull red of the blackberry with wonderful scarlets and crimsons.

Nothing is known of the ages of these trees. There are six in the group, two of which are more or less hidden from view by their fellows. Beginning with the most southerly trees, their dimensions are as follows:—

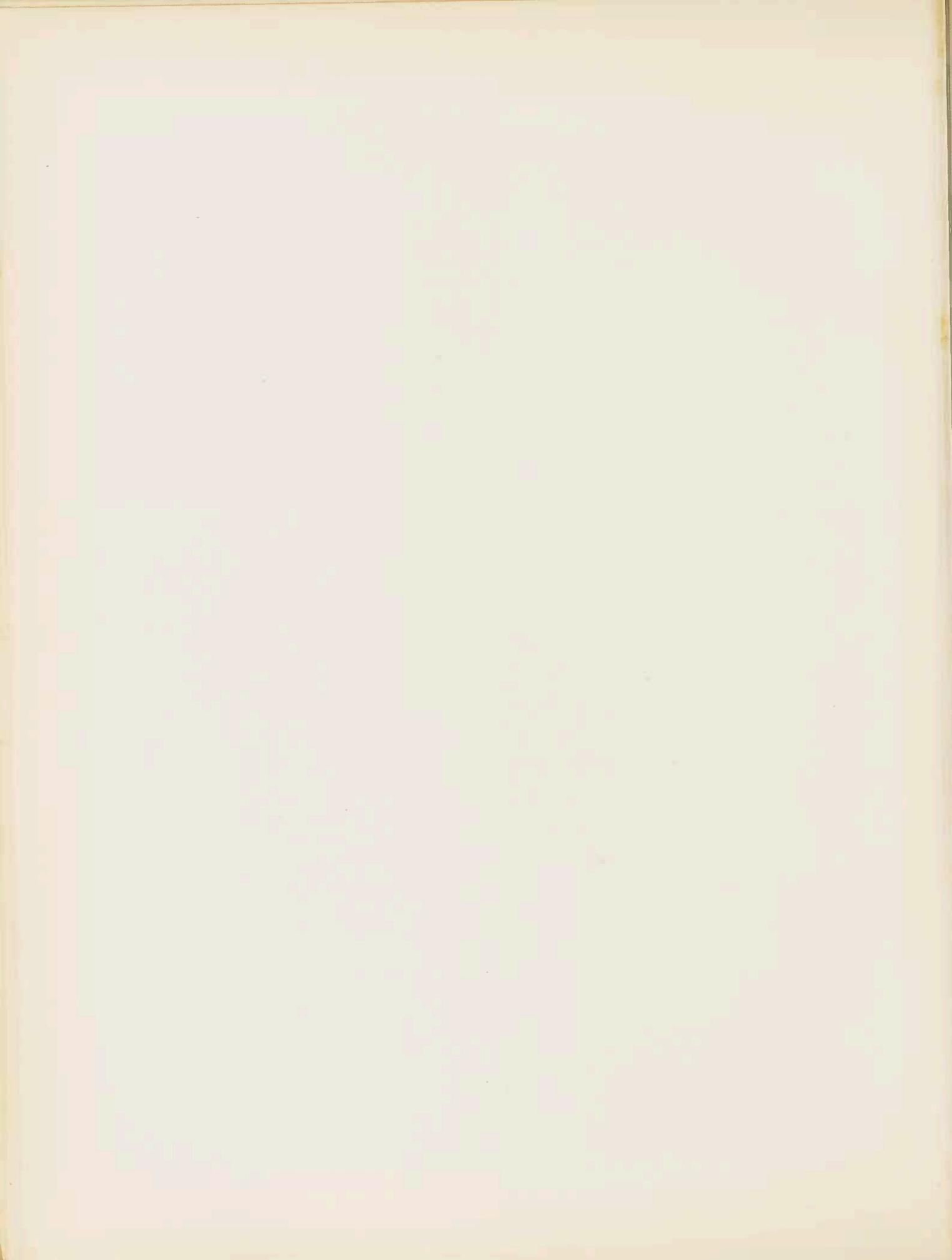
No.	Girth at five feet.	Height.
1	4 feet 4 inches	35 feet.
2	4 " 6 "	40 "
3	5 " 4 "	40 "
4	3 " 1 "	38 "
5	3 " 5 "	40 "
6	3 "	25 "

There is a seventh tree standing near, but not included in the view, whose girth is 5 feet 3 inches, and height 42 feet.

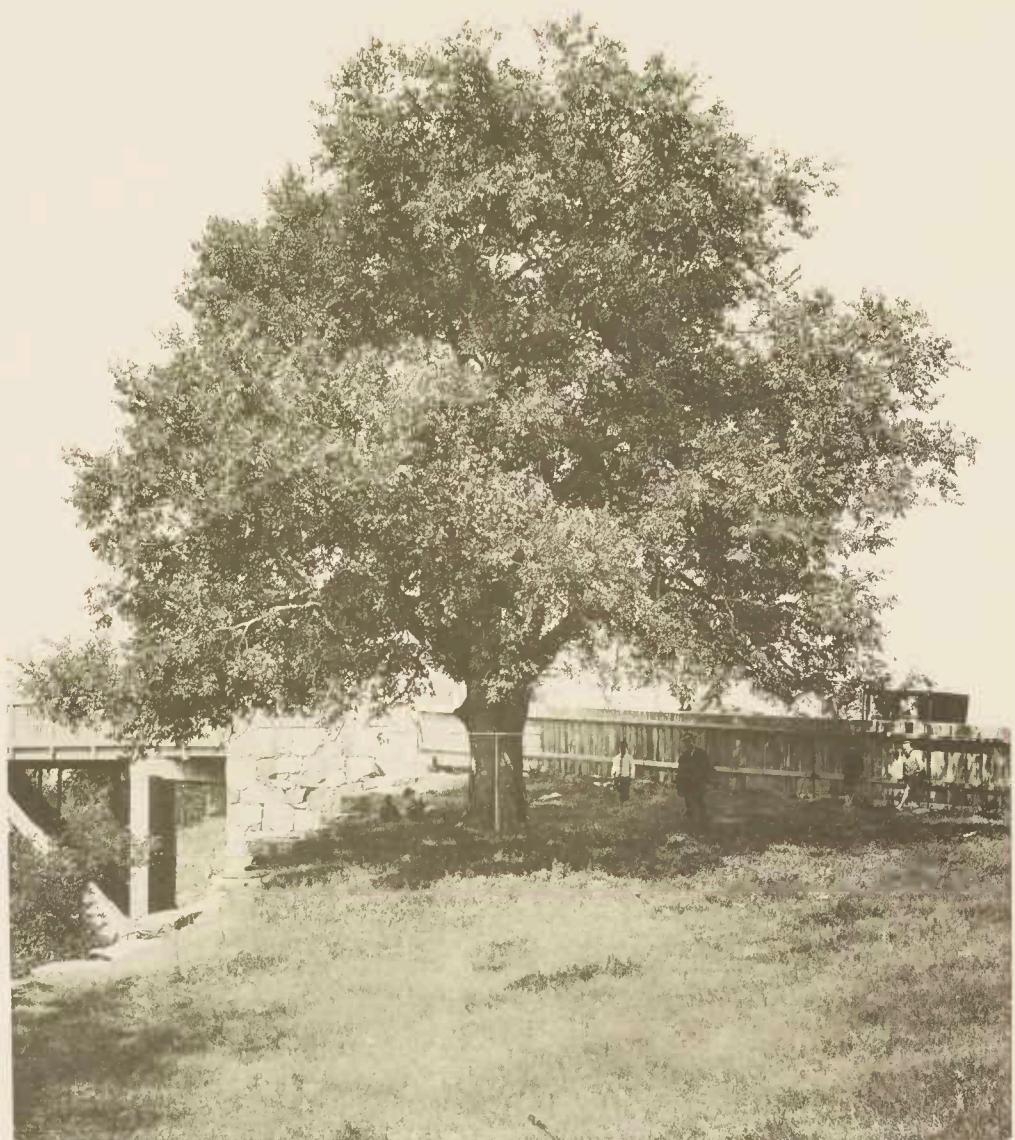
XXXVIII.



GROUP OF TUPELOES, WEST MEDFORD.







NETTLE TREE, LOWELL.







XL.



NETTLE TREE, LOWELL.





THE LOWELL NETTLE TREES.

CELTIS OCCIDENTALIS, L.

TWO fine specimens of this rare Massachusetts tree stand near the Pawtucket Street bridge over the "new canal," one on each side of the water. The northernmost (Plate XL) was chosen by Emerson to represent the species, and is figured in the latest edition of his Report.

The other tree (Plate XXXIX) grew naturally beside a wall in what is now Ford Street. In 1874 it became necessary to take it out of the street; and as it was forty feet high, the usual recourse to the axe seemed inevitable. But J. B. Francis, then agent of the Locks and Canals Company, determined to save it. Late in the fall, before the frost set in, he marked around the tree a circle twenty-one feet in diameter, and around the outside of this circle dug a trench four feet deep, which he filled with hay and covered with boards. When the ground had frozen four feet down, the hay had kept the frost from the bottom of the trench. The tree therefore stood in the centre of a disk of frozen earth twenty-one feet across, and four feet thick at the centre. In February, 1875, timbers were placed beneath it, and by means of rollers and jack-screws it was moved 18 feet 4 inches northerly, in alignment with the row of trees that stretches down the southern bank of the canal. The estimated weight of disk and tree was 45.83 tons.

These trees were standing in 1822, when Emerson visited the site of what is now Lowell. There is no early record of their girth and height.

Dimensions of the southern tree:—

1882.	Girth at eighteen inches where it forks	10 feet 5 inches.
	Spread	50 "
1890.	Girth at eighteen inches	11 " 7 "
	Spread	57 "
	Height	55 "

Dimensions of the northern tree:—

1887.	Girth at five feet from ground	8 feet $2\frac{1}{2}$ inches.
	Spread east to west	46 "
1890.	Girth at five feet from ground	8 " 6 "
	Spread east to west	50 "
	Height	45 "

THE BATCHELDER SASSAFRAS.¹

SASSAFRAS OFFICINALE, NEES.

THE sassafras, mostly known throughout New England as a shrub or small tree, in favorable situations sometimes attains noble proportions. In the town of Reading, at the corner of Main and Franklin Streets, stands the finest tree of its species yet reported within the limits of Massachusetts. The dimensions given, though rare here, are not uncommon in the South.

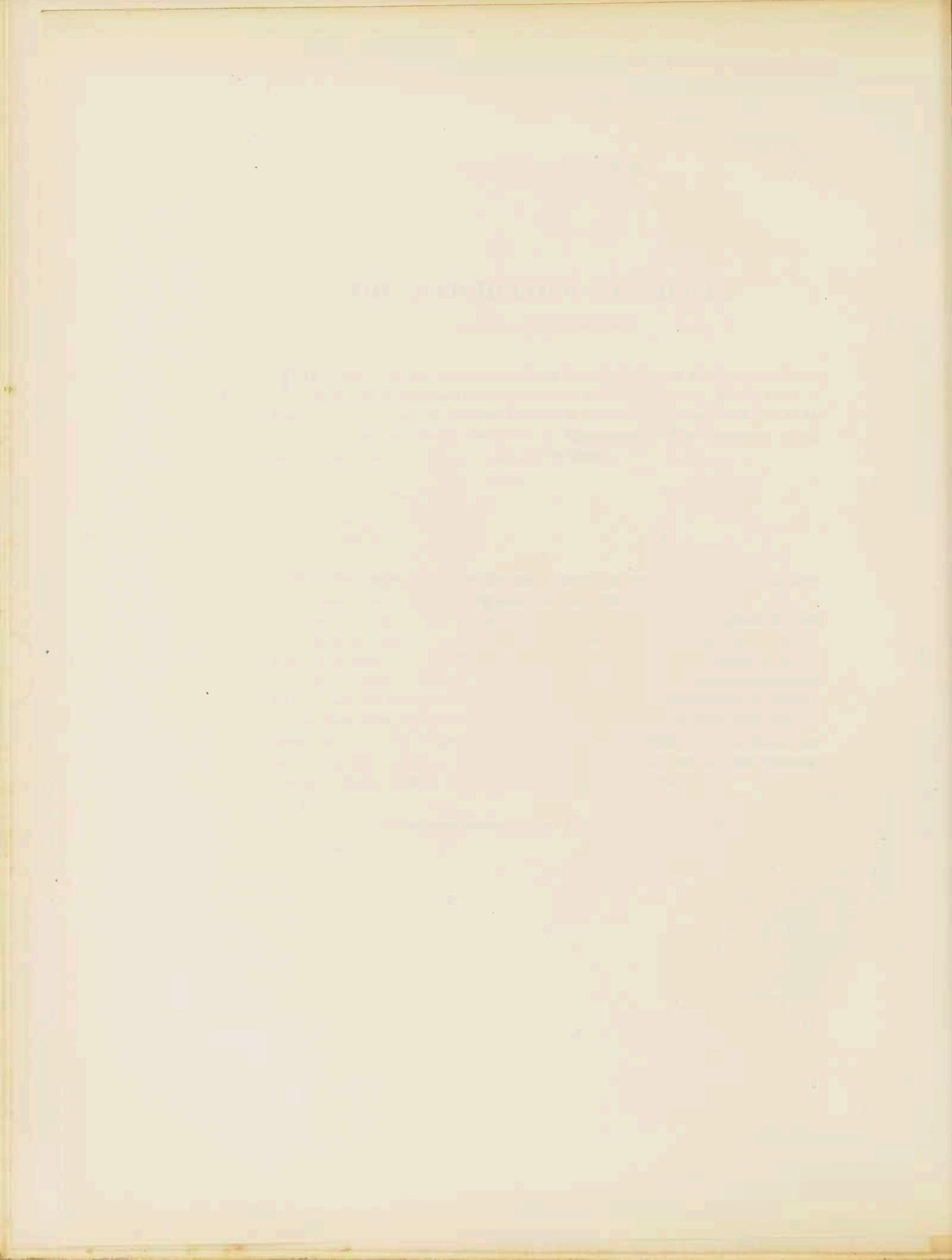
Circ. at ground (1887)	10 feet 3 inches.
“ “ four feet.	8 “ 1 inch.
Height	58 “
Spread	30 “

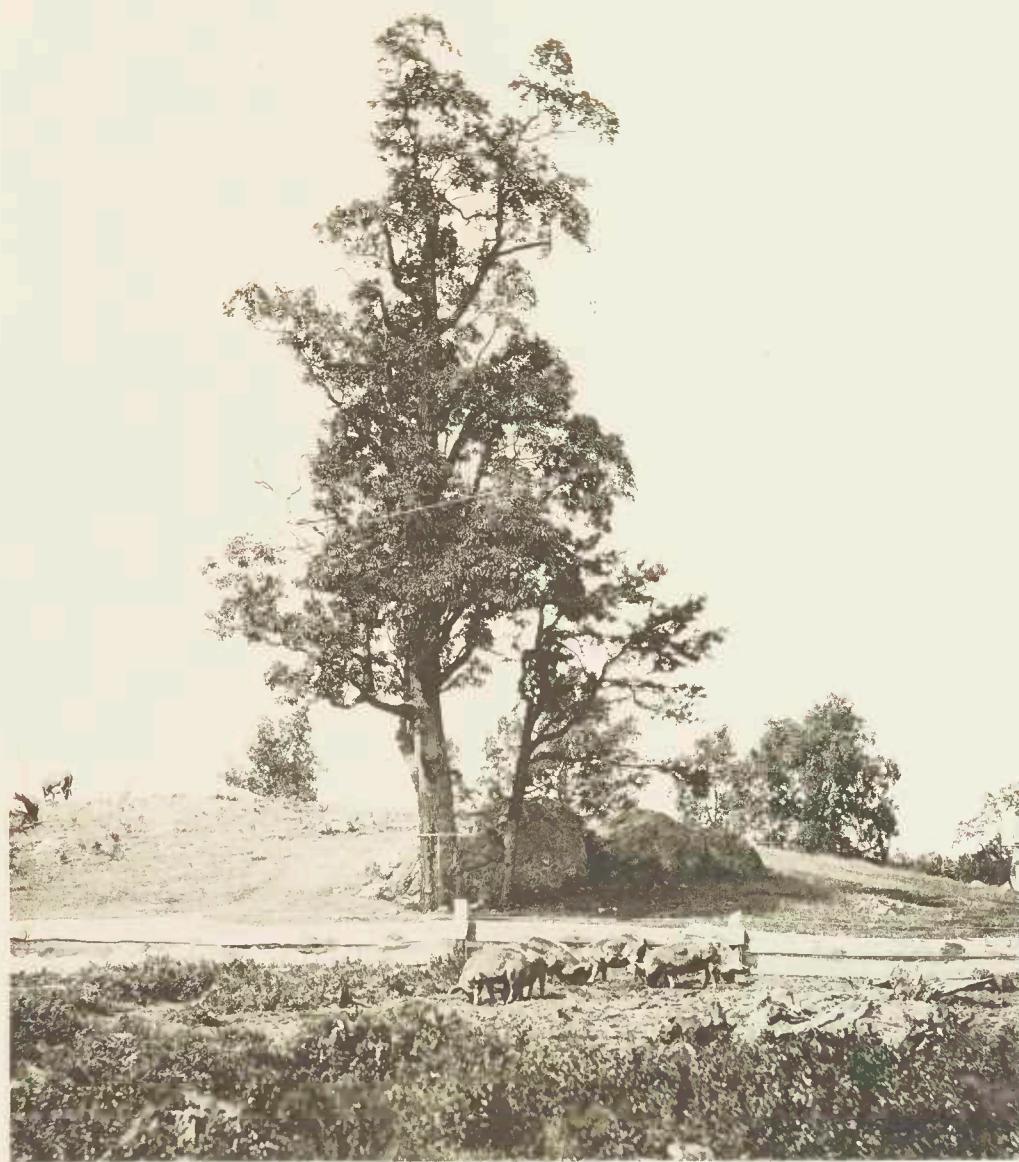
Since the sassafras grows rapidly, and is known to have attained a height of forty to fifty feet in thirty years, this tree may not date back farther than 1800.

As early as 1825 it appears to have been a thrifty tree, though despoiled at times of the aromatic bark of its roots. It was saved from serious damage by the sparseness of population; but in 1844, with the building of a district school-house in the immediate vicinity, a crisis came in the life of the tree. Then began a long struggle for existence with its natural enemies,—the boys. The care and vigilance of Captain George Batchelder, on whose land it stood, and for whom it has been appropriately named, saved it from destruction during his lifetime. Members of the Batchelder family still watch over it; but local pride is perhaps its most efficient guardian. Though evidently past its prime, it is still in good condition.

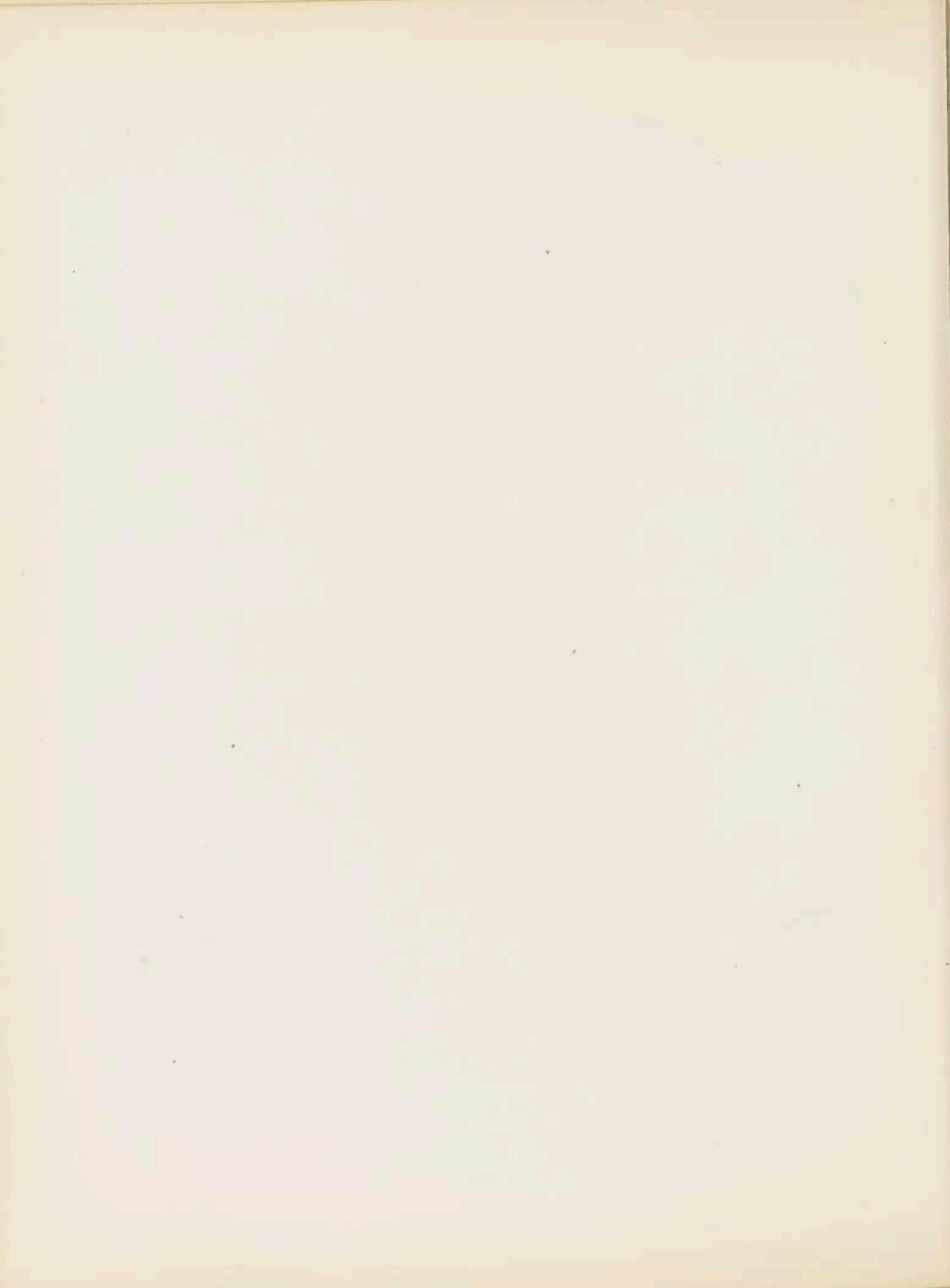
¹ Facts and measurements are taken from "Trees of Reading," by Mr. F. H. Gilson.



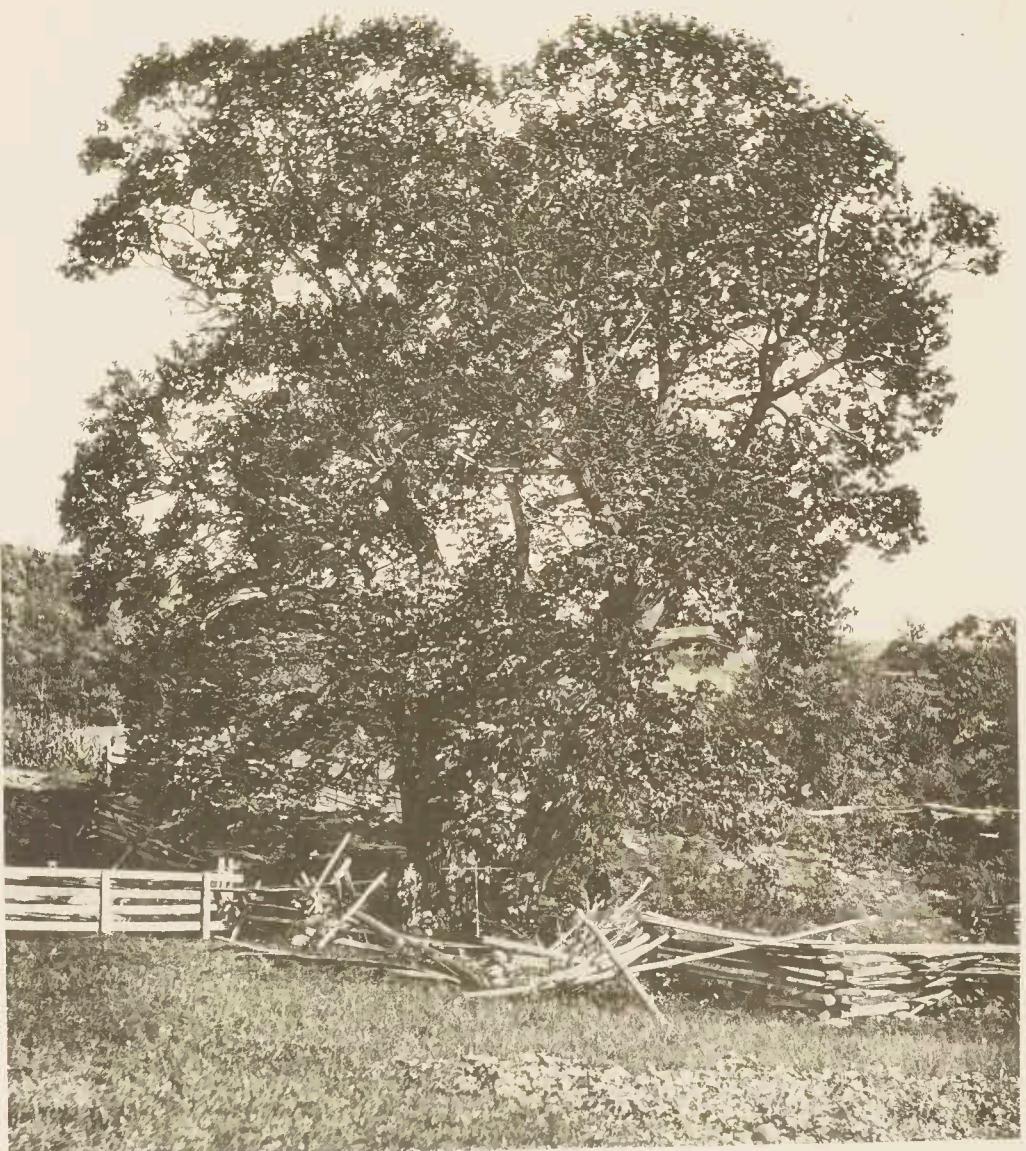




THE BATCHELDER SASSAFRAS, READING.







THE NEWTON CHESTNUT, BERNARDSTON.





THE BERNARDSTON CHESTNUT.

CASTANEA SATIVA, MILL., VAR. AMERICANA.

What an hour was that,
When after roving in the woods
('T was April then), I came and sat
Below the chestnuts, when their buds
Were glistening to the breezy blue. — TENNYSON.

THIS fine chestnut stands in a pasture, on the slope of Bald Mountain, Bernardston, a few rods southeast of the barn of G. P. Newton. It is known to be over a hundred years old, and is "probably one hundred and fifty." Many limbs broken off or dead at their extremities, indicate waning vital forces; but it still bears freely every year.

Dimensions, July, 1889:—

At four feet from ground	25 feet.
Height at point of forking about	7 "
Girth of largest limb	12½ "

THE BROOKS BLACK WALNUT.

JUGLANS NIGRA, L.

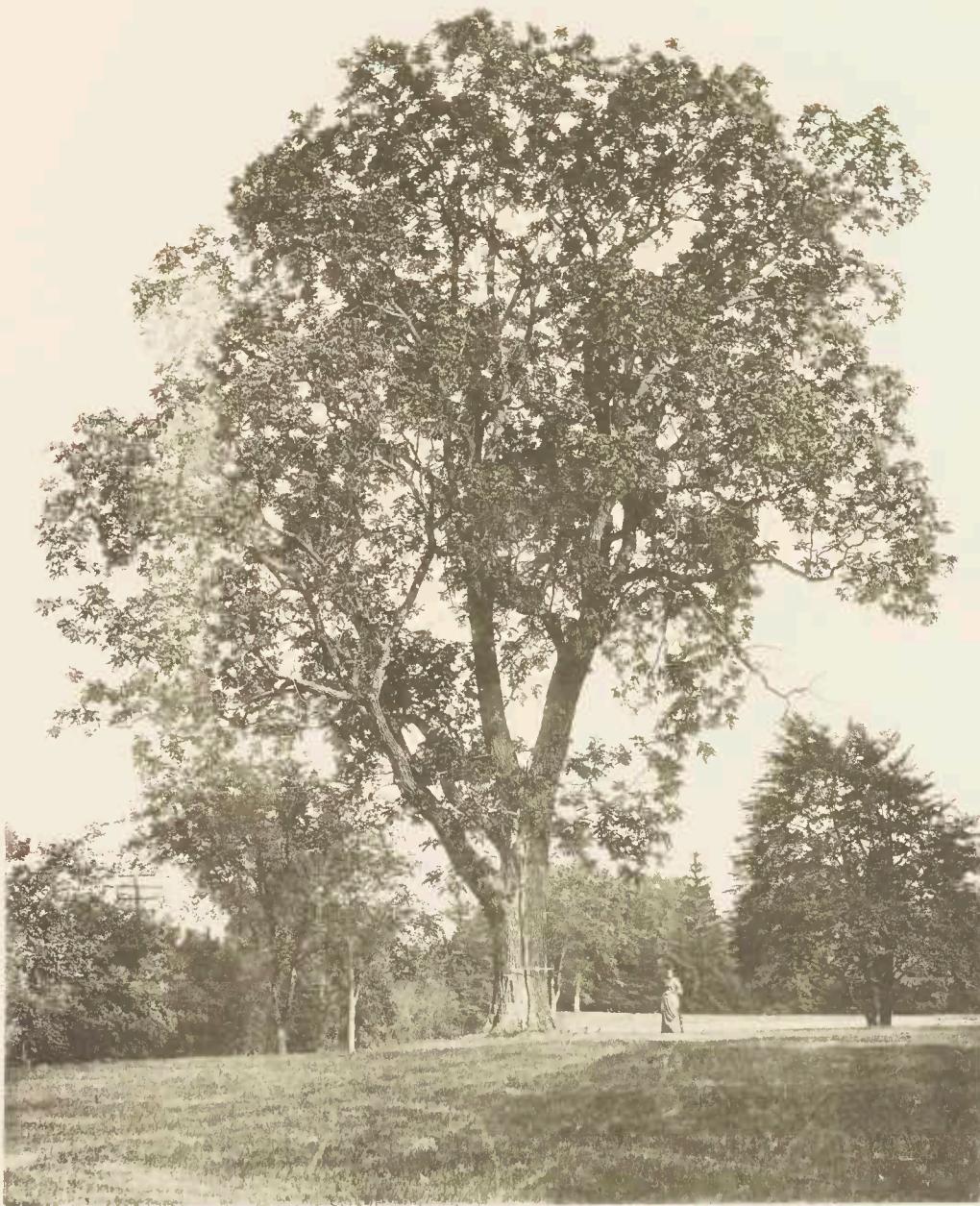
THE black walnut is a rare tree in New England, probably indigenous nowhere near the sea-coast. As it grows well in rich soils when introduced, there appears to be nothing in the climate to prevent its free development. Of this the Brooks Black Walnut, in West Medford, is a notable example. It is situated on the estate of Peter C. Brooks, about a quarter of a mile from the Boston and Lowell Railway Station. It stands in the open, on a slight rise, and at first glance might be taken for one of the great elms in the vicinity. A little to the south and west there stood formerly a small frame-house built by Samuel Brooks 2d at the time of his marriage in 1721; he died in 1768. Within these dates, according to tradition, the tree was set out. The assumption of one hundred and fifty years of life seems not unreasonable.

A generation ago it was a magnificent tree in full vigor; and it gave no marked signs of decay previous to 1878, in which year the lightning struck in the top, bolts passing down the two chief branches, uniting at their junction, and ploughing a deep furrow along the main trunk to the earth. The pathway of the discharge, visible in the picture, laid the tree open to the weather, thus accelerating, if not inducing decay. With the efforts recently made to stop further ravages, it may survive another generation,—one of the finest representatives of its species outside the valley of the Mississippi and its tributaries.

In 1883 it measured 13 feet $6\frac{1}{2}$ inches in circumference at five feet from the ground; and in October, 1888, the same figures still hold good.

The first great branch is thrown off at a height of about ten feet; a little higher, the trunk separates into one small and two large branches; these in turn subdividing into numerous branchlets, forming a large round head, very imposing when in full leaf. It still fruits freely. The greatest expanse is 75 feet, and the height 82 feet.





THE BROOKS BLACK WALNUT, WEST MEDFORD.





WHITE OAK, BERNARDSTON.





A WHITE OAK, BERNARDSTON.

QUERCUS ALBA, L.

THE oak here figured stands on the westerly slope of a pasture known as "Purple Meadow," Bernardston. It is in perfect condition, and has a symmetrical head unusual in large trees of the species. Nothing is known of its history.

Girth at five feet from ground	10 feet 8 inches.
Greatest spread	78 "
Height	80 "

THE BURLEY OAK, DANVERS.

QUERCUS ALBA, L.

THIS noble tree stands in the grounds and near the house of George A. Peabody, Burley Street, Danvers. It is one of five trees scattered over the old "Burley Farm," and locally known as the "Burley Oaks."

It is said to have been pollarded, in common with its companions, about ninety years ago, in order to "throw the strength of the tree into the knees," and make it more valuable for ship-timber. It is thought that the present decrepitude of these trees is due more to the mutilation they suffered at that time than to the natural decay of age; the great lateral spread of this oak may be due to the same cause, but in the absence of systematic observation in the past, it is impossible to draw conclusions of any value.

According to measurements taken by Mr. Peabody, Aug. 19, 1884, the girth of this tree at five feet from the ground was 12 feet, and its lateral spread 150 feet. Since that date an immense limb, 75 feet in length and externally sound, fell on a still day, carrying with it a third of the trunk. The decayed matter was carefully removed, the interior surface exposed was painted, and the upper portion of the break protected by a copper cap, to prevent further damage by water.

The photograph is taken on the uninjured side of the tree.

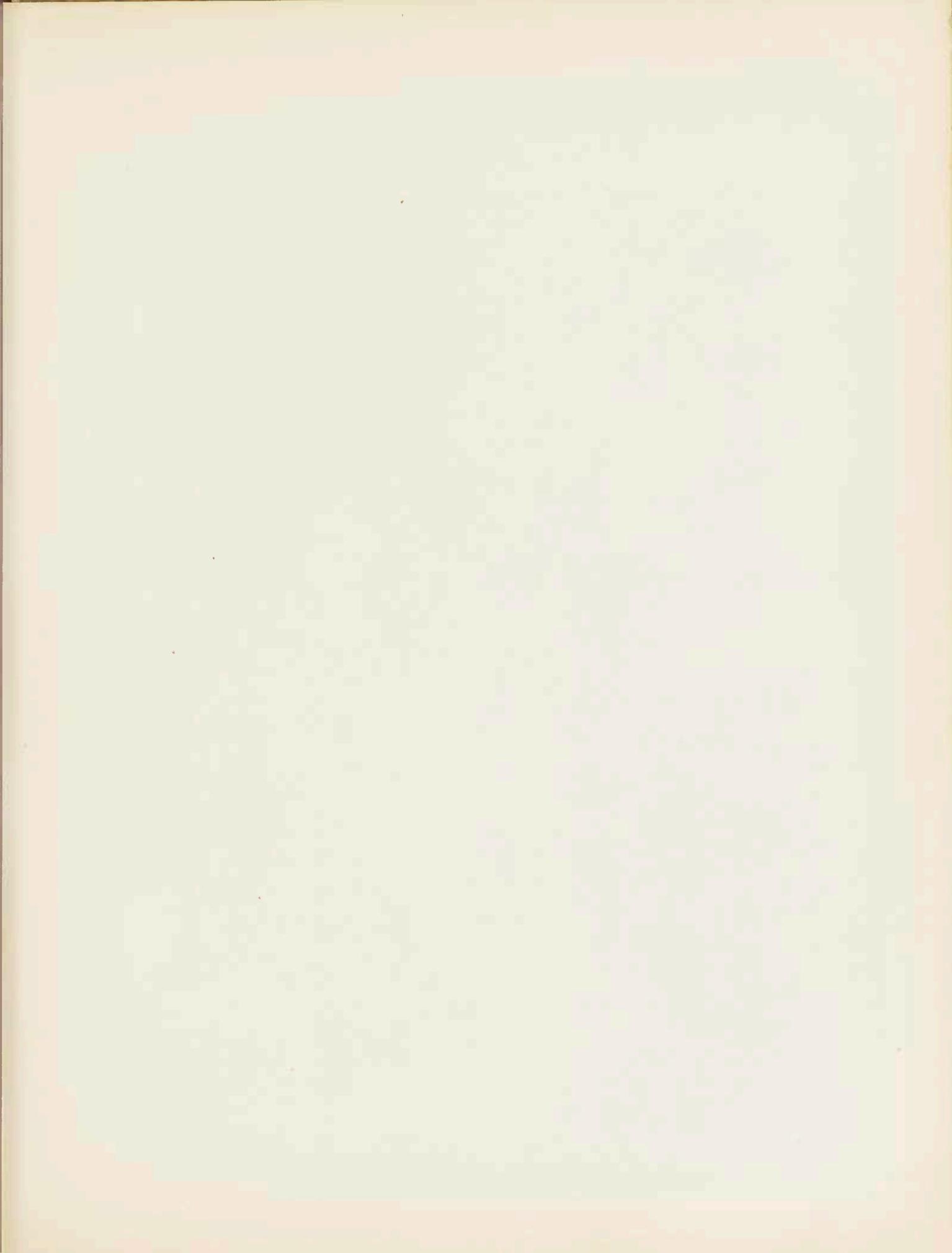
The greatest spread at the present date	85 feet.
Height	55 "



XLV.



THE PEABODY OAK, DANVERS.





THE ELIOT OAK, NATICK.





THE ELIOT OAK.

QUERCUS ALBA, L.

Dromio of Syracuse. I, sir, am Dromio; command him away.
Dromio of Ephesus. I, sir, am Dromio; pray let me stay.

WHEN John Eliot had become a power among the Indians, with far-reaching sagacity he judged it best to separate his converts from the whites; and, accordingly, after much inquiry and toilsome search, gathered them into a community at Natick,—an old Indian name formerly interpreted as “a place of hills,” but now generally admitted to mean simply “my land.” Anticipating the policy which many believe must eventually be adopted with regard to the entire Indian question, Eliot made his settlers land-owners, conferred upon them the right to vote and hold office, impressed upon them the duties and responsibilities of citizenship, and taught them the rudiments of agriculture and the mechanic arts.

In the summer of 1651 the Indians built a framed edifice, which answered, as is the case to-day in many small towns, the double purpose of a school-room on week-days and a sanctuary on the Sabbath. Prof. C. E. Stowe once called that building the first known theological seminary of New England, and said that for real usefulness it was on a level with, if not above, any other in the known world.

It is assumed that two oaks, one of the red, and the other of the white species, of which the present Eliot Oak is the survivor, were standing near this first Indian church. The early records of Eliot’s labors make no mention of these trees. Adams, in his life of Eliot, says: “It would be interesting if we could identify some of the favorite places of the Indians in this vicinity,” but fails to find sufficient data. Bigelow (or Biglow, according to old spelling), in his “History of Natick,” 1830, states: “There are two oaks near the South Meeting-house which have undoubtedly stood there since the days of Eliot.” The antiquity of the oaks seems at that date never to have been called in question, and Bigelow naturally neglected to put in any evidence, as he was writing for townsmen whose grandfathers may have been among the first settlers of Natick.

Bacon, in his "History of Natick," 1856, more guardedly remarks: "The oak standing a few rods to the east of the South Meeting-house bears every evidence of an age greater than that of the town, and was probably a witness of Eliot's first visit to the 'place of hills.'"

The writer upon Natick in Drake's "Historic Middlesex" contents himself with the non-committal remark: "Tradition links these trees with the Indian missionary."

The antiquarians have never been able to agree upon the respective claims of these trees. The Red Oakites stoutly maintain that the Red Oak, which stood nearly in front of the old Newell Tavern, was the original Eliot Oak. The late Austin Bacon, who was familiar with the early history and legends of Natick, stated that "Mr. Samuel Perry, a man who could look back to 1749, often said that Mr. Peabody, the successor to Eliot, used to hitch his horse by that tree every Sabbath because Eliot used to hitch his there."

This oak was originally very tall; the top was probably broken off in the tremendous September gale of 1815, as it was reported to be in a mutilated condition in 1820. Time, however, partially concealed the disaster by means of a vigorous growth of the remaining branches. In 1830 it measured seventeen feet in circumference two feet from the ground. It had now become a tree of note, and would probably have monopolized the honors to the exclusion of the present Eliot Oak, had it not met with an untimely end. The keeper of the tavern in front of which it stood had the tree cut down in May, 1842. This act occasioned great indignation, and gave rise to a lawsuit at Framingham, "which was settled by the offenders against public opinion paying the costs and planting trees in the public green." A cartload of the wood was taken home by the spectators to make into canes and other relics.

The White Oakites base their claims upon the relative rates of growth of the two species. It is quite possible, say they, that in Eliot's time the acorn from which the Red Oak sprang had not been grown, while the White Oak must have been a tree of consequence. Moreover, grant that the Red Oak was standing, and that Eliot hitched his horse beneath it: this of itself would show that he preached beneath the other tree.

The rival claims of Red Oak and White Oak,—*par nobile fratrum*,—who shall decide? Whether Eliot preached beneath this tree or that, can never conclusively be settled.

"The king is dead, long live the king!" Upon the demise of the old monarch the Red Oakites transferred in the main their allegiance, and the White Oak now holds an almost unquestioned supremacy. It stands east of the Unitarian Meeting-house, which is on or near the spot where Eliot's first church stood. In 1856, according to Bacon, it measured $14\frac{1}{2}$ feet in circumference at two feet from the ground; in June, 1888, the same figures hold good. At four and a half feet from the ground its girth, 1888, is 14 feet 1 inch; spread from east to west, 84 feet; and height, 64 feet. At the height of four and a half feet, the trunk sends off a large limb to the west, and two feet above separates into three large branches. It is in truth a kingly tree, conspicuous alike from its isolated position, its mighty limbs, and noble head. It is in the full vigor of maturity, the tips of its branches giving no hint of decadence.

Mrs. Stowe has given it a new claim to notice, for beneath it, according to Drake's "Historic Middlesex," "Sam Lawson, the good-natured, lazy story-teller in 'Oldtown Folks,' put his blacksmith's shop. It was removed when the church was built."

Thou ancient oak! whose myriad leaves are loud
With sounds of unintelligible speech,—
Sounds as of surges on a shingly beach,
Or multitudinous murmurs of a crowd,—
With some mysterious gift of tongues endowed,
Thou speakest a different dialect to each.
To me a language, that no man can teach,
Of a lost race long vanished like a cloud;
For underneath thy shade, in days remote,
Seated like Abraham at eventide
Beneath the oak of Mamre, the unknown
Apostle of the Indian, Eliot, wrote
His Bible in a language that hath died,
And is forgotten save by thee alone. — LONGFELLOW.

THE AVERY OAK.

QUERCUS ALBA, L.

An unquelled exile from the summer's throne,
Whose plain, uncinctured front more kingly shows,
Now that the obscuring courtier leaves are flown. — LOWELL.

THIS ancient tree is situated about half a mile from Dedham village, on East Street, near the site once occupied by the dwelling-house of Deacon Avery, after whom the tree was named. The claim put forth by the local historian, that it is "probably much older than the town" (253 years), is singularly modest, and will pass unchallenged by those most familiar with the stately white oaks of New England.

When the good frigate "Constitution" was building, the sum of \$70, it is said, was offered for the oak, and declined by the owner. The citizens of Dedham have always held the tree in honor, and have put its likeness upon the town-seal, adopted in 1878.

The ground on which it stands was purchased a few years ago by J. W. Clark, and presented to the Dedham Historical Society.

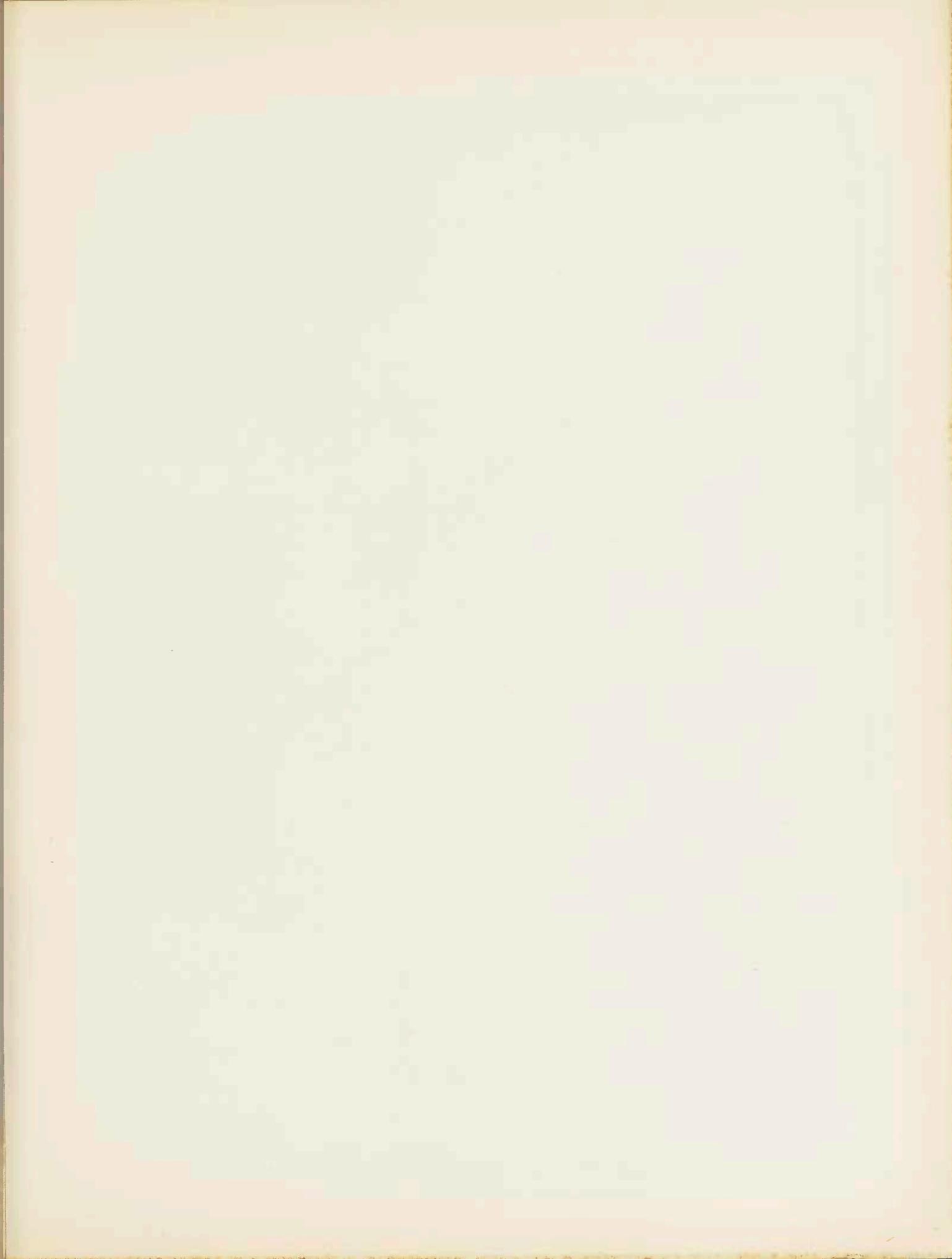
It bears evidence of rough usage by winds and lightning, but is still a worthy type of the white oak.

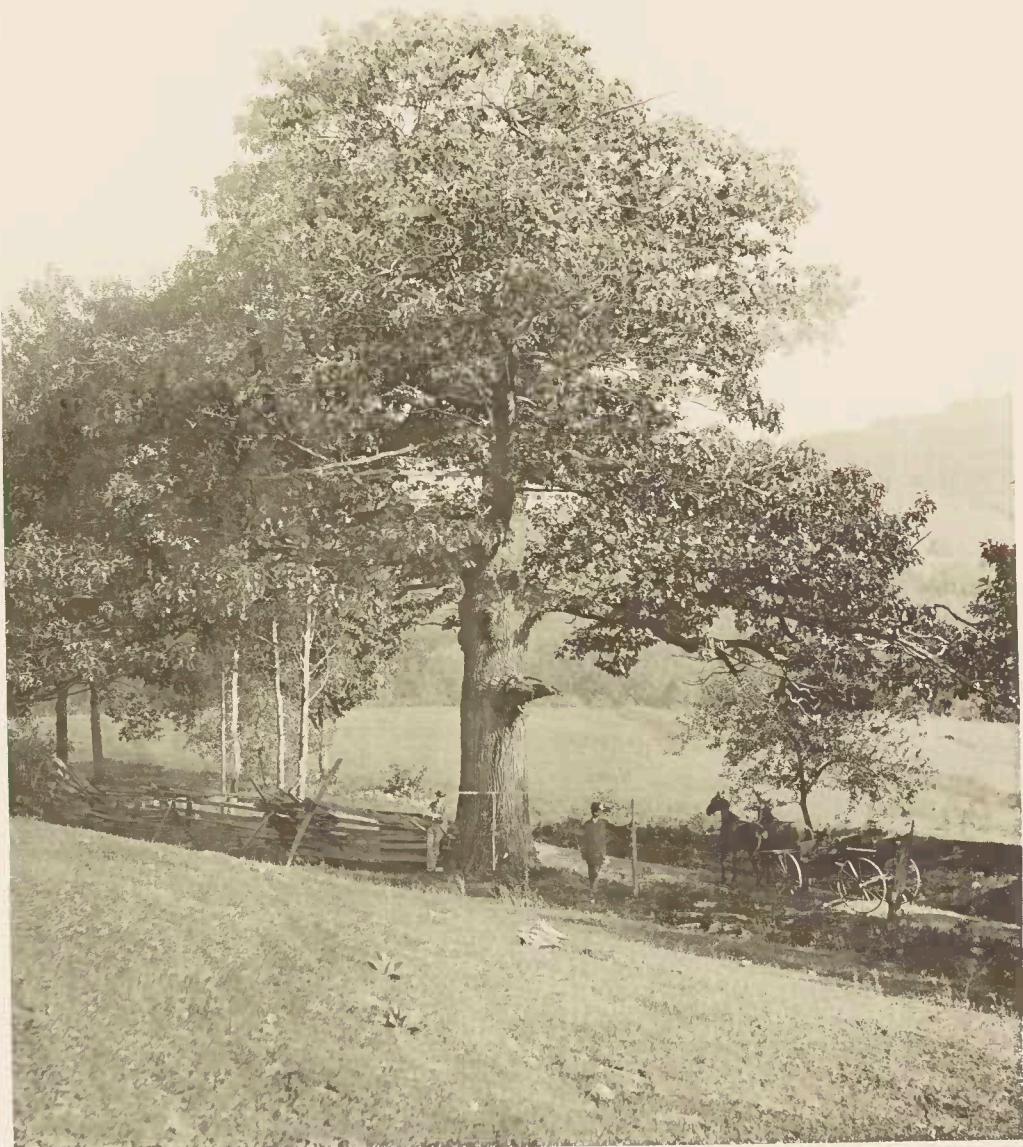
Girth at five feet from lower side	15 feet 11 inches
Girth at five feet from upper side	15 " 5 "
Spread	83 "
Height	80 "





THE AVERY OAK, DEDHAM.





SOCIETY OAK, CHARLEMONT.

THE SOCIETY OAK.

RED OAK. *QUERCUS RUBRA, L.*

THIS tree is about two miles east of Charlemont village, and fifty rods west of the centre school-house. Under its shade the old men of to-day, when school-boys sixty years ago, ate their dinner at noon tide; and under the same sheltering branches those from the vicinity who are still living gather with their families once a year in memory of "auld lang syne." The exercises are brief speeches by such as are talkers, singing, and recitations by the children.

Nothing is known of its age. The old residents say it was nearly as large when they were children. But over the trees of youth there has fallen an evil spell; stretch and tower as they may, they can never keep pace with the expanding horizon of manhood. In this year of grace 1890 the dimensions are:—

Girth at five feet from the ground	14 feet 6 inches.
Greatest spread	75 "
Height	58 "

THE CARTER OAK, LANCASTER.

RED OAK. *QUERCUS RUBRA, L.*

"E'en the oak
Thrives by the rude concussion of the storm ;
He seems indignant, and to feel
Th' impression of the blast with proud disdain."

THE Carter Oak stands at the foot of the eastern slope of George's Hill, by the side of a road that was a highway as early as 1660. The age is unknown, but there is little doubt that it is a survivor of the primeval forest. We should infer that it was in Emerson's day in the full vigor of maturity; but the past fifty years have told cruelly upon its constitution: the losses are mainly on the side not represented in the portrait. It is still a noble oak, the great trunk rising with little diminution some twenty feet before it begins to throw out its mighty branches.

Girth at five feet, 1890	18 feet 5 inches.
Girth at six feet, 1890	17 " 8 "
Girth at six feet, 1840 (Emerson)	14 " 10 "

This gives an average annual increase in diameter for fifty years of .21 inches.

Height 82 feet



Notes of a Naturalist

THE OAKHILL HABITAT.

BY JAMES WOODS.

PRINTED FOR THE AUTHOR
BY THE AUTHOR'S SON,
JAMES WOODS.

London: Printed for the Author by his Son, James Woods, 1868.
Price, 12s. 6d. net.

THE OAKHILL HABITAT.
A NATURAL HISTORY OF THE
FAUNA AND FLORA OF A
WOODLAND HABITAT.

BY JAMES WOODS, M.A., F.R.S., F.L.S., &c.

WITH PLATES DRAWN FROM NATURE BY THE AUTHOR.

IN TWO VOLUMES. VOL. I.

THE FAUNA OF THE OAKHILL HABITAT.

WITH PLATES DRAWN FROM NATURE BY THE AUTHOR.

IN TWO VOLUMES. VOL. II.

THE FLORA OF THE OAKHILL HABITAT.

WITH PLATES DRAWN FROM NATURE BY THE AUTHOR.

IN TWO VOLUMES. VOL. III.

THE FAUNA AND FLORA OF THE OAKHILL HABITAT.

WITH PLATES DRAWN FROM NATURE BY THE AUTHOR.

IN TWO VOLUMES. VOL. IV.

THE FAUNA AND FLORA OF THE OAKHILL HABITAT.

WITH PLATES DRAWN FROM NATURE BY THE AUTHOR.

IN TWO VOLUMES. VOL. V.

THE FAUNA AND FLORA OF THE OAKHILL HABITAT.

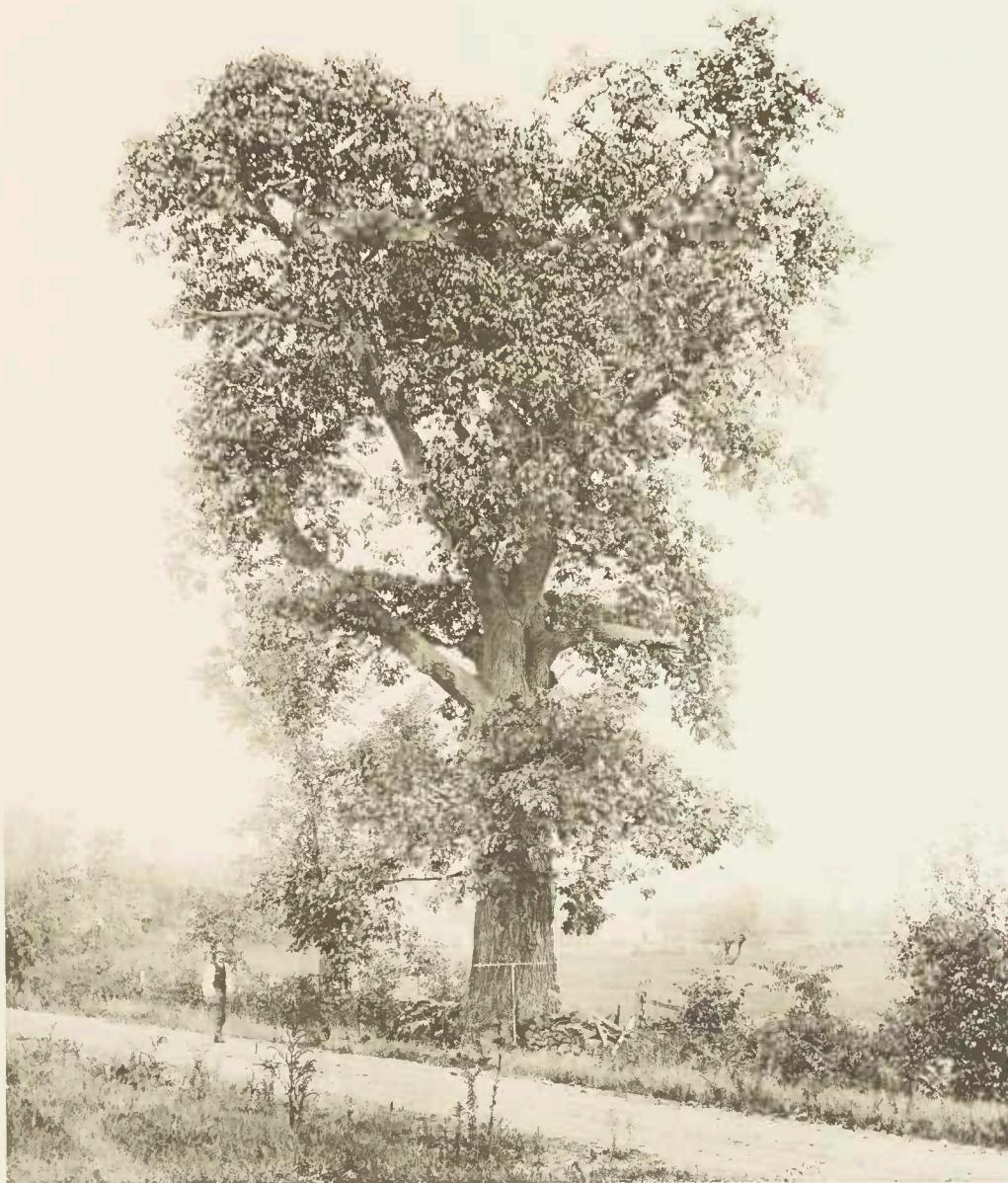
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IN TWO VOLUMES. VOL. VI.

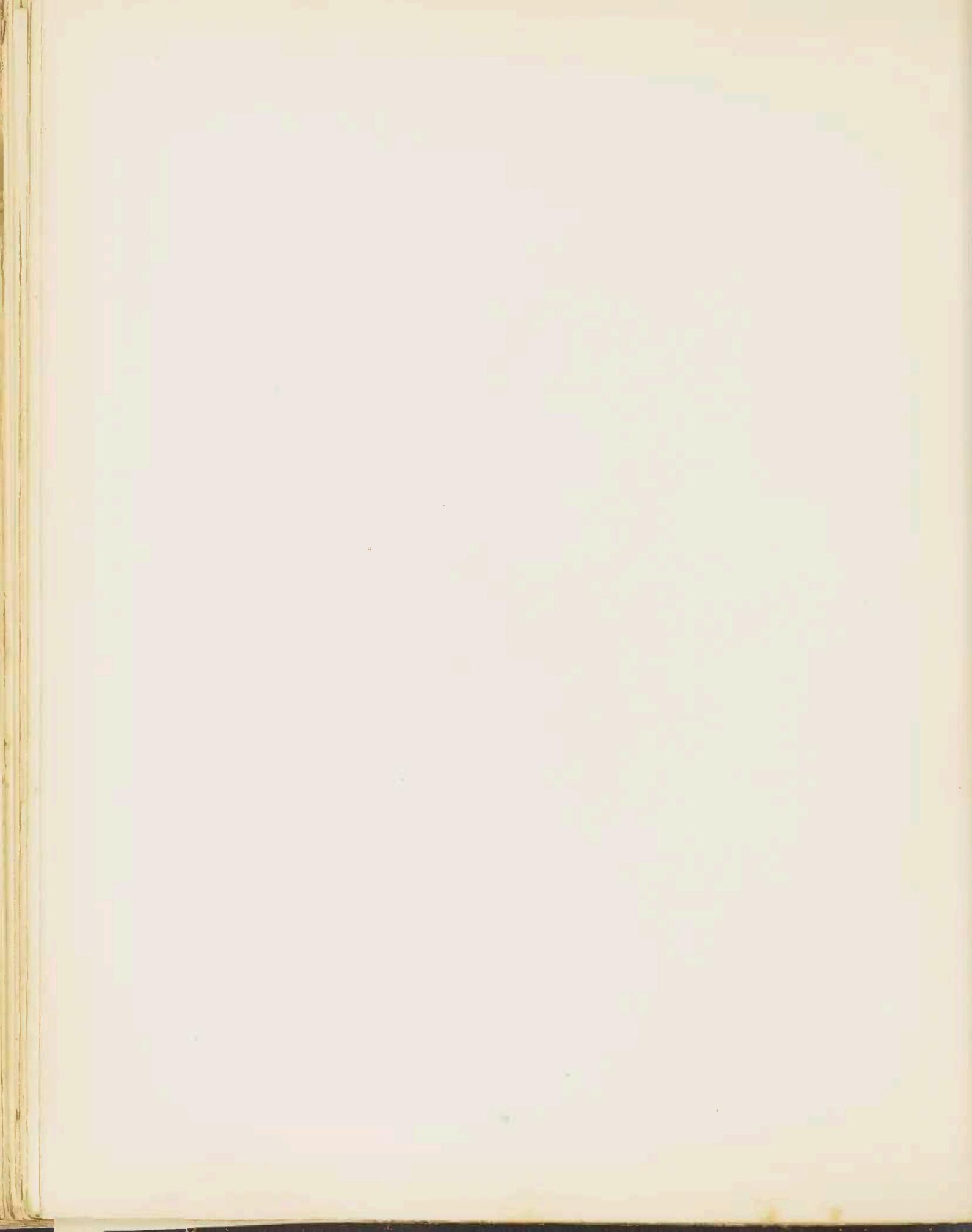
THE FAUNA AND FLORA OF THE OAKHILL HABITAT.

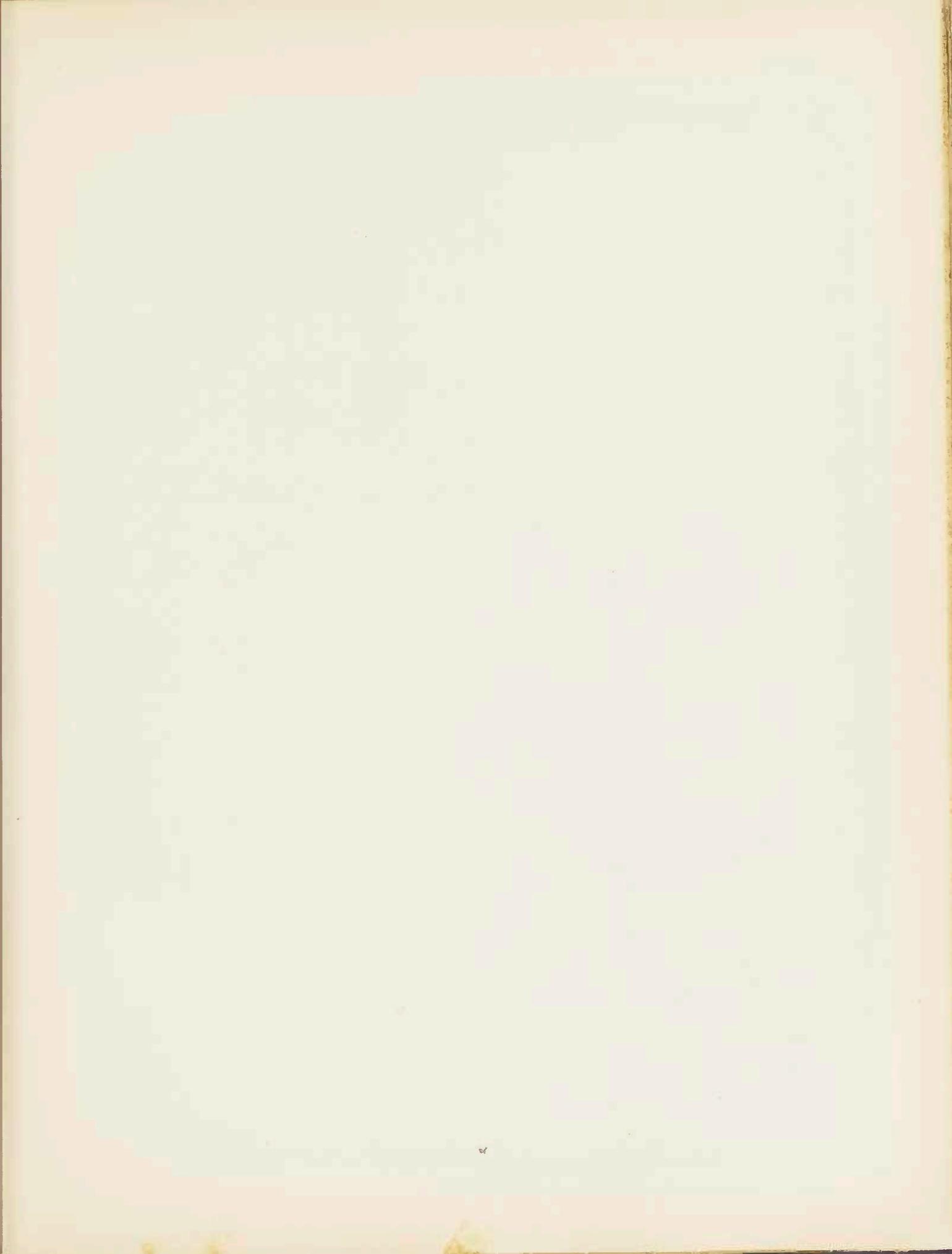
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IN TWO VOLUMES. VOL. VII.



THE CARTER OAK, LANCASTER.



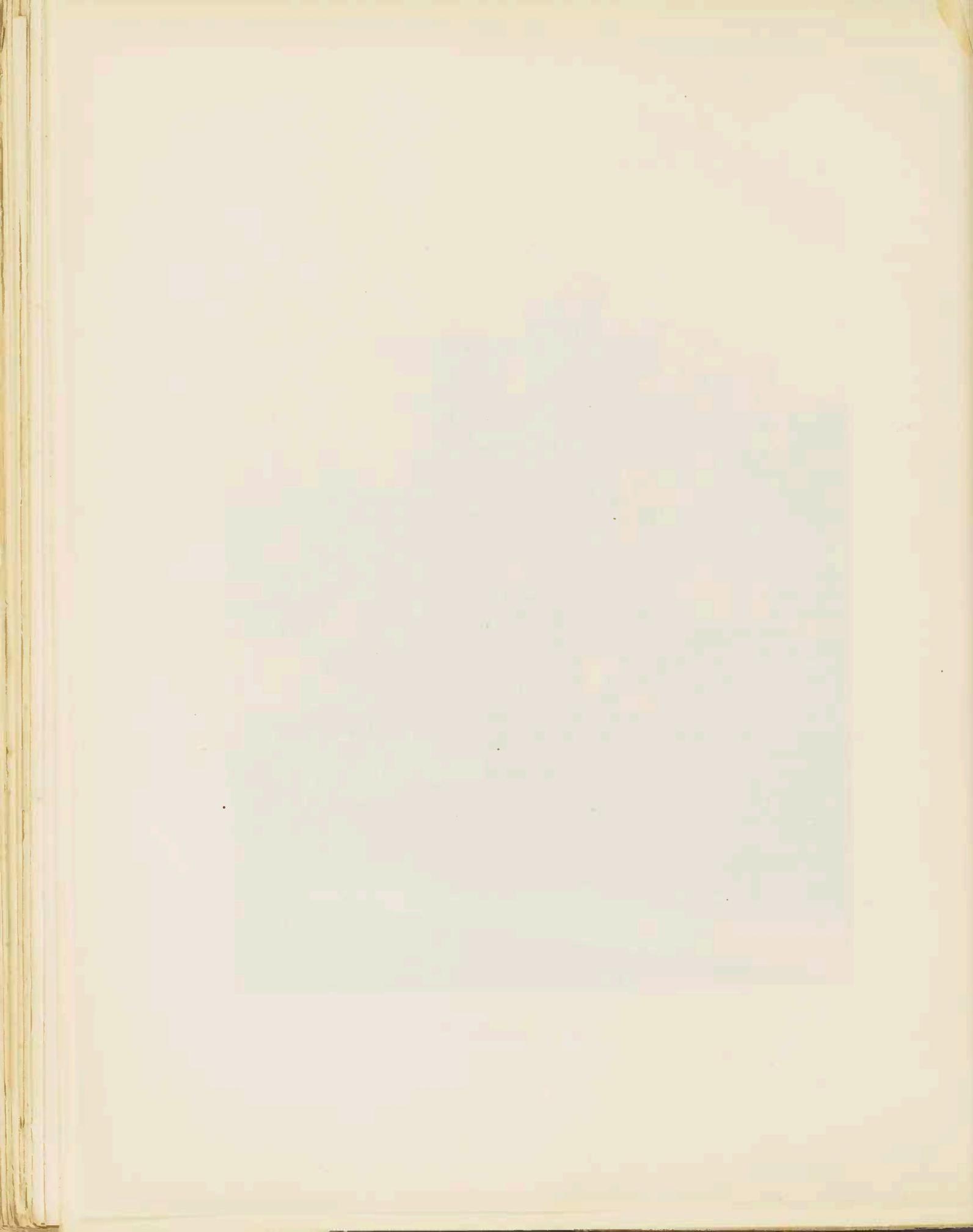


L.



THE BEAMAN OAK, LANCASTER.





THE BEAMAN OAK, LANCASTER.

RED OAK. *QUERCUS RUBRA*, L.

Thou wast a bauble once, a cup-and-ball
Which babes might play with ; and the thievish jay,
Seeking his food, with ease might have purloined
The auburn nut that held thee. — COWPER.

THE estate once held by the Beaman family is situated in the north part of the centre village, on the old turnpike from Leominster to Boston; but the Beamans themselves long since disappeared from their ancestral homestead.

The oak stands in front of the house now owned and occupied by Asher Jewett.

In a town where so much pride is felt in its noble trees, it is somewhat strange that no documentary evidence can be found touching their age. Upon a change in the ownership of property, even the traditions that family pride keeps alive from one generation to another fade out utterly. With regard to the Beaman Oak, Henry S. Nourse writes: —

"If set out by any one, and not a relic of the primeval forest, it must have been by some of the pioneers, and probably by the first Gamaliel Beaman, who came here in 1659, or by his son John."

It may, and probably does, antedate the settlement of the town; but the data with regard to the life-history of the red oak and its rate of growth in youth and age are far too incomplete to serve as a basis of calculation.

The tree is yet vigorous, rising grandly above its buttressed trunk, and clothed with leaves to the tips of its gnarled limbs.

Its dimensions, June, 1880, were: —

Girth at five feet from ground	17 feet 8 inches.
Subdivides at	10 "
Height	70 "
Spread about	75 "

THE WAVERLY OAKS.

WHITE OAK. *QUERCUS ALBA*, L.

A brotherhood of venerable trees.—WORDSWORTH.

Beneath huge trees, a thousand rings of spring
In every bole, a song on every spray.—TENNYSON.

NOT far from Waverly station in the town of Belmont, but within the limits of the city of Waltham, there is a fine example of the geological formation known as a "kame." Clearly marked for a sixth of a mile, it is a feature of great beauty in the landscape, and well worthy of imitation as a form of subdivision in our park system; so kindly moulded is it that it awakens in the visitor scarcely a suggestion of the mighty forces that, expiring, gave it birth. Eastward, Beaver Brook, passing under North Street, finds its way amid fringing shrubbery over gentle grades to the Charles. Once it must have been a considerable stream, much wider than at present.

The Waverly Oaks are scattered over an area of several acres, upon the pasture-land sloping to the brook. Some of them drink of its waters, while others grow upon the sides of the long kame,—its most appropriate adornment,—“their deep roots piercing the gravel deposits to the alluvium beneath.” While solitary oaks as large as these are not uncommon, it is not likely there is another group of such noble trees within the Eastern States. With one exception, they are white oaks, now twenty-five in number. Strength, endurance, fixedness are theirs,—sylvan virtues conspicuous even more in winter, when the snow lights up the scarred trunks, and the great limbs stand naked against the sky. The sturdy individualism characteristic of the oak pushes now and then to the verge of eccentricity. Each differs from its fellows, each is worthy the pencil of the artist; as a whole, they admirably illustrate the variant types of the species.

Southward of the kame, the photographer finds a marvellous theme in a shallow pool beset with asters and tall grasses. At the water's edge, an inverted oak—the solitary swamp white oak (*Q. bicolor*, Willd.) of the group—stretches downward



L.I.



THE BIG WHITE OAK, WAVERLY GROUP.







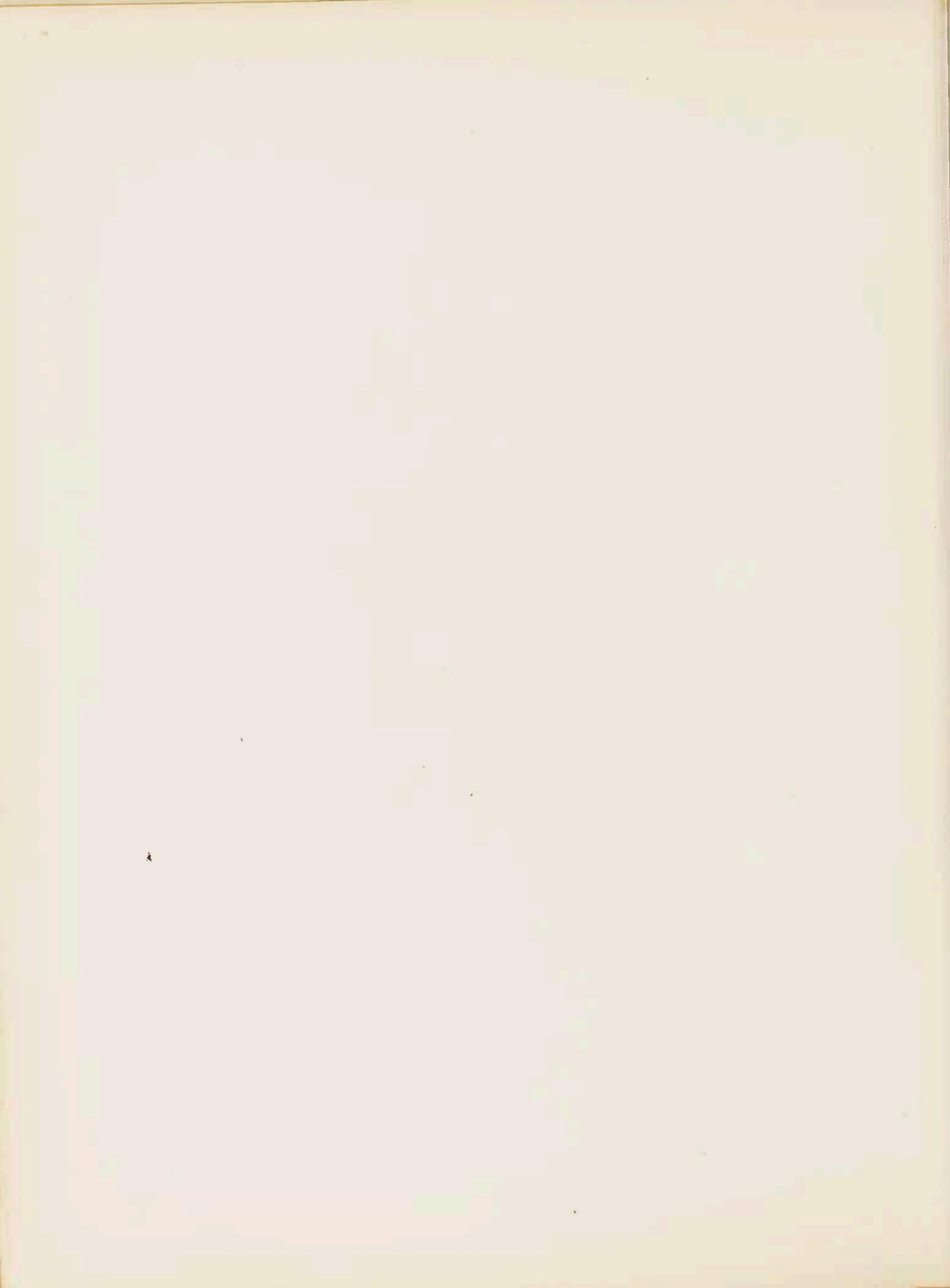


THE BIG WHITE OAK, WAVERLY GROUP.





SWAMP WHITE OAK, WAVERLY.



to an inverted sky. Five feet from the ground it measures 12 feet 6 inches in circumference; its height is 65 feet. Although this oak, as well as its neighbors, fruits freely, there are no middle-aged or young trees. Were their successors ready to take the place of the failing veterans, a part of the fine impressiveness of the scene would be lost.

Here, perhaps, Stillman painted his picture of the oaks, now in possession of the poet Lowell. Here, perhaps, the poet himself caught the felicitous phrasing in Sir Launfal:—

“The crows flapped over by twos and threes,
In the pool browsed the cattle up to their knees,
The little birds sang as if it were
The one day of summer in all the year.”

The crows still remain,—perhaps the identical birds, for in popular repute they share with the raven length of days,—and June is still vocal with songsters undispossessed by the English sparrow.

It has always been a source of wonder how these trees escaped the shipbuilders of Medford, to whom the big oaks in their vicinity, one after another, fell victims,—at a time, too, when the Middlesex Canal was transporting ship-timber that had been floated down the Merrimac from the remote wilds of New Hampshire. It is thought that a dispute with regard to ownership, the details of which are not definitely known, had something to do with their preservation at this critical period.

The age of these trees, some of them apparently in the full vigor of maturity, others lightly touched by time, some falling into decrepitude, who shall tell? The rings of growth closely approximate, if they are not indeed absolutely coincident with, the years of life. The trees from time to time prostrated by the wind have been found to be hollow. Agassiz, it is said, roughly estimated the age of one of these at a thousand years. If the rings are to be taken in evidence, a more conclusive judgment is attainable. Some forty-five years ago one of the smaller oaks was cut down,—probably to assert ownership,—and the rings, which were counted by Mr. Lowell, numbered over seven hundred and fifty. In the light of this revelation, Agassiz's estimate comes quite within the range of probability. The largest and presumably the oldest of the group, the noble tree whose portrait accompanies this sketch, may well have sheltered Lief Ericson beneath its branches, and must have been at its best when Columbus re-discovered America. It stands upon the northern slope of the kame, is about fifty feet high, and measures, five feet from

the ground, 18 feet $7\frac{1}{2}$ inches in circumference, enlarging to some 28 feet over the swell of the roots. It throws out at broad angles huge, irregular branches; one enormous limb, the strength of whose mortising is the architects' wonder, pushes northward more than fifty feet. It was once much longer, perhaps twenty feet, when the mighty trunk, working to its full capacity, sent the life-giving sap to the remotest twigs. As the rim of life narrows, and the water-raising power lessens, the secondary symptoms of decay set in. The extremities of the limbs, deprived of nourishment, dry up, become brittle, and break off, or else stand out amid the foliage,—unsightly reminders that oaks, too, are mortal.

A huge stump marks the site of a whilom neighbor of this oak,—a great buttonwood admired by our fathers. Its prostrate forks still lie along the stream. The old elm, conspicuous from the highway, is now a picturesque ruin; while the oak, which has already outlived three or four generations of buttonwoods and elms, has in it the promise of decades yet of life.

INTRODUCED TREES.

THE trees whose portraits follow are not natives of Massachusetts,—two of them not even of the United States; but they are so thoroughly naturalized that it may be doubted if their foreign origin is generally known. The acacia reaches its highest development in the lower Ohio river basin, but grows spontaneously in the mountains of Pennsylvania, perhaps even farther north. The wise bird that builds her nest in its top has little to fear from the predatory school-boy. The horse-chestnut has been for more than a hundred years a common ornamental and shade tree. Generations of children have gathered its polished nuts in play, and the farmer has carried them in his pocket to "draw out" his rheumatism. The group to which *Salix fragilis* belongs (Groome Willow, Plate LVII), is familiar in New England. The willows that compose it are planted near the sea-coast and along the sides of the roads across marshes, and often—apparently without the agency of man—fringe rivers for miles of their course. Trees that propagate themselves readily, attain great size, and are effective features in the landscape, find appropriate place in this volume.

THE KINGSLEY ACACIA, BERNARDSTON.

GLEBITSCHIA TRIACANTHOS, L.

THOUGH the three-thorned acacia is not uncommon under cultivation in the New England States, it has been introduced in most, if not all cases, from farther south, and does not attain its greatest size within our limits.

The Kingsley Acacia stands in front of the old Kingsley house, where it was set out about a hundred years ago by a Mrs. Kingsley, who brought it from Connecticut in her work-bag. It was probably a nursery seedling.

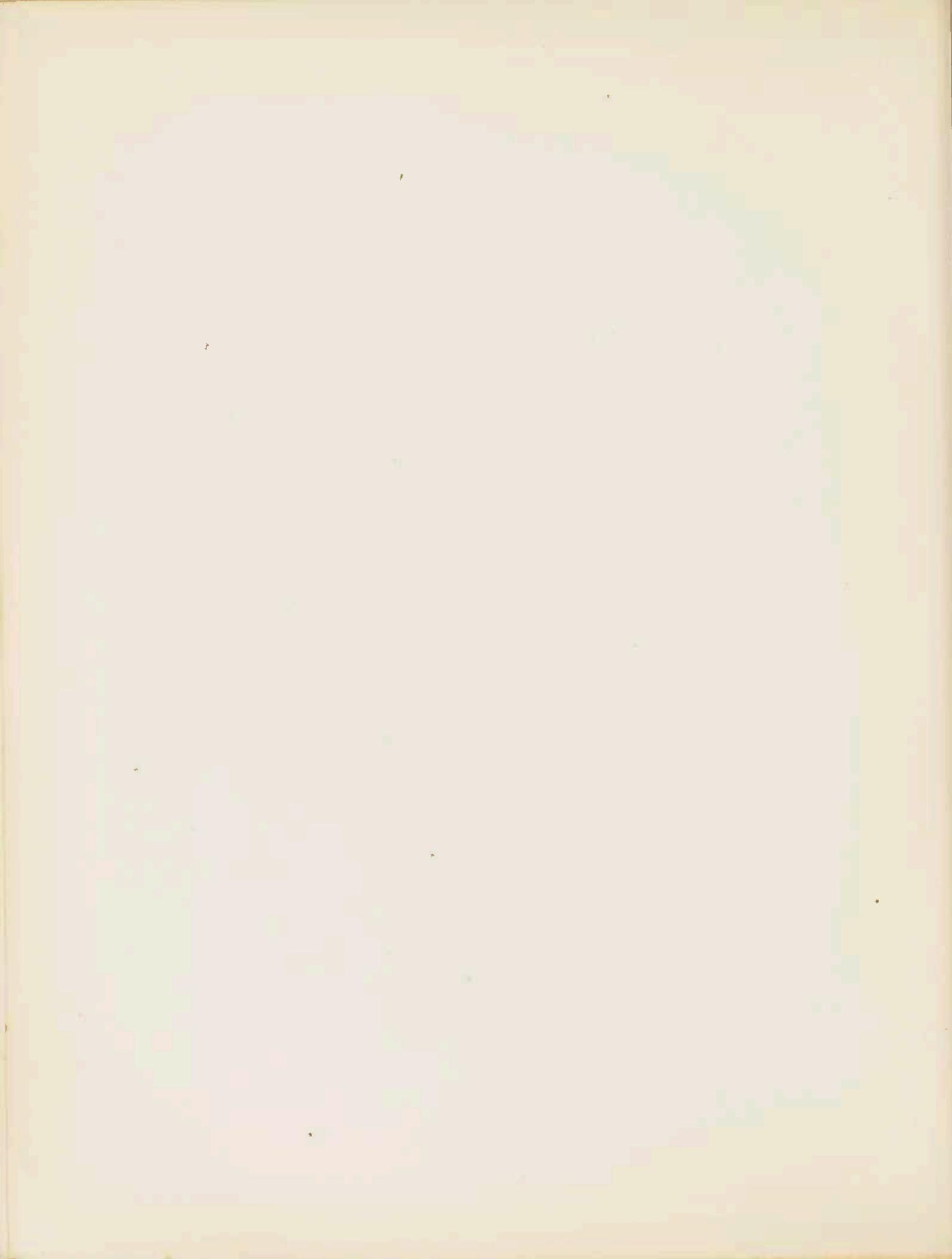
It has thriven well, and is still in perfect condition. This spring, Mrs. Kemplin, the present owner, was offered \$30 for the tree, to cut into tree nails.

1889.	Girth at five feet from ground	10 feet 5 inches.
	Spread	40 "
	Height	50 "





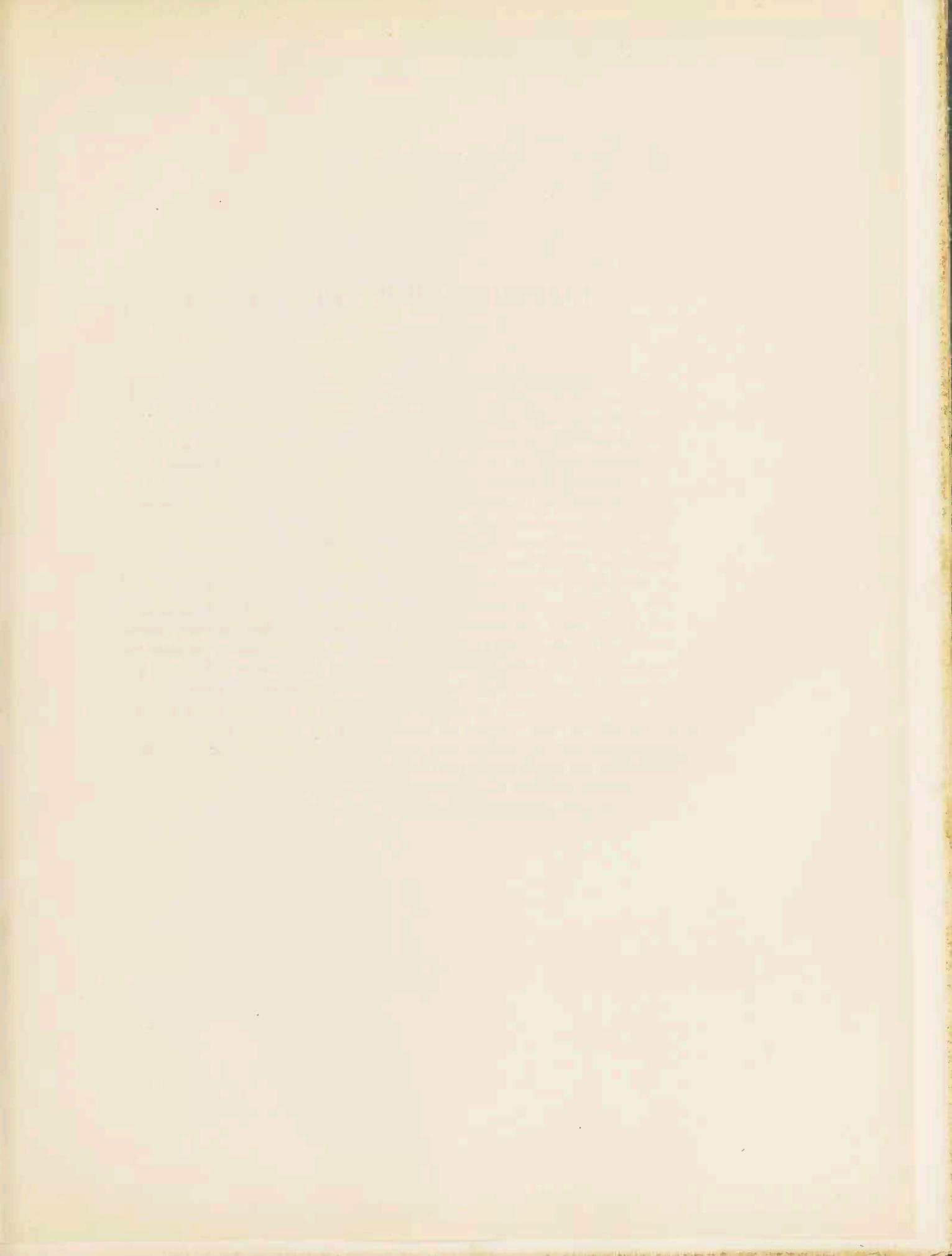
THE KINGSLEY ACACIA, BERNARDSTON.







THE EVERETT HORSE-CHESTNUT.



THE EVERETT HORSE-CHESTNUT.

AESCULUS HIPPOCASTANUM, L.

THERE stands on Chelsea Street, Everett, an old house that dates back, it is probable, as far as the first quarter of the eighteenth century. It was occupied in 1668 by James Mellen, and is mentioned in all the successive transfers of the property. It is known as the Captain Blaney house, presumably in commemoration of a former owner, Benjamin Blaney, who was in command of the Malden company on the day of the Lexington alarm. It is now owned by William J. Partridge.

In front of this landmark of colonial times there are three horse-chestnuts, one of which, in the southeast corner of the lot, has long been conspicuous for size and beauty. Compared with the ancient horse-chestnuts of English parks, it is not a great tree, nor yet is it remarkable for length of days. Unlike most of the subjects of these biographies, its beginnings are definitely known. It was brought, with its companions, from the Gardiner Greene place, in Pemberton Square, Boston, over seventy years ago, and must accordingly be about seventy-five years old. At five feet from the ground, inside of the fence, its girth is 12 feet 5 inches. It subdivides at a height of six or seven feet into three main branches, which run up almost vertically, throwing out secondary branches at a broad angle, and forming a very fine top. Its widest spread is 50 feet, and height about 65 feet.

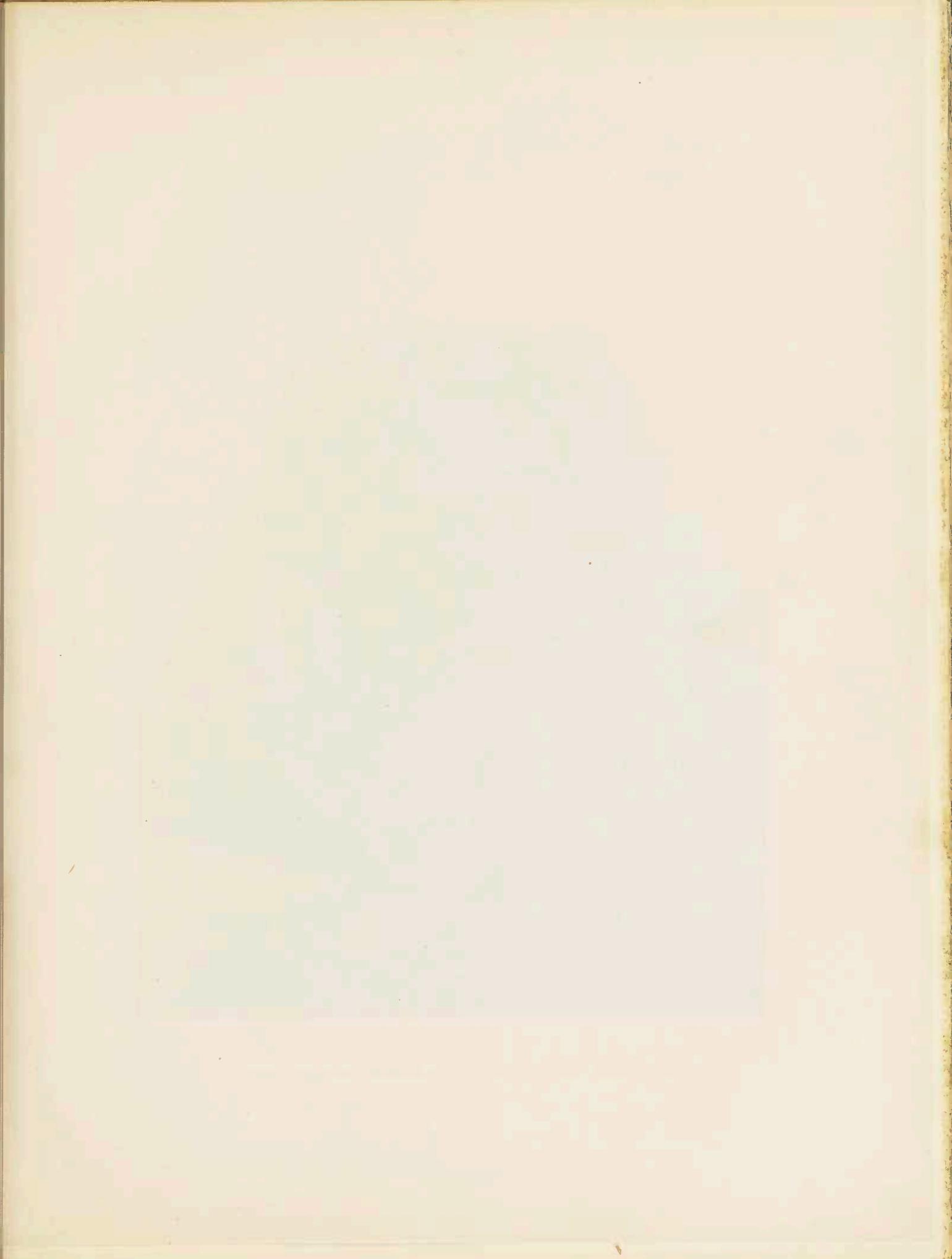
In rapidity of growth it has far outstripped its fellows of equal age, the nearest of which, at five feet from the ground, has a girth of 8 feet, and the more remote of 5 feet 3 inches. It is hard to account for the superior size of the eastern tree on any theory which also explains why the westernmost invariably blossoms, it is said, first, the middle second, and the easternmost last, as if reserving its splendid head of flowers for a grand floral climax.

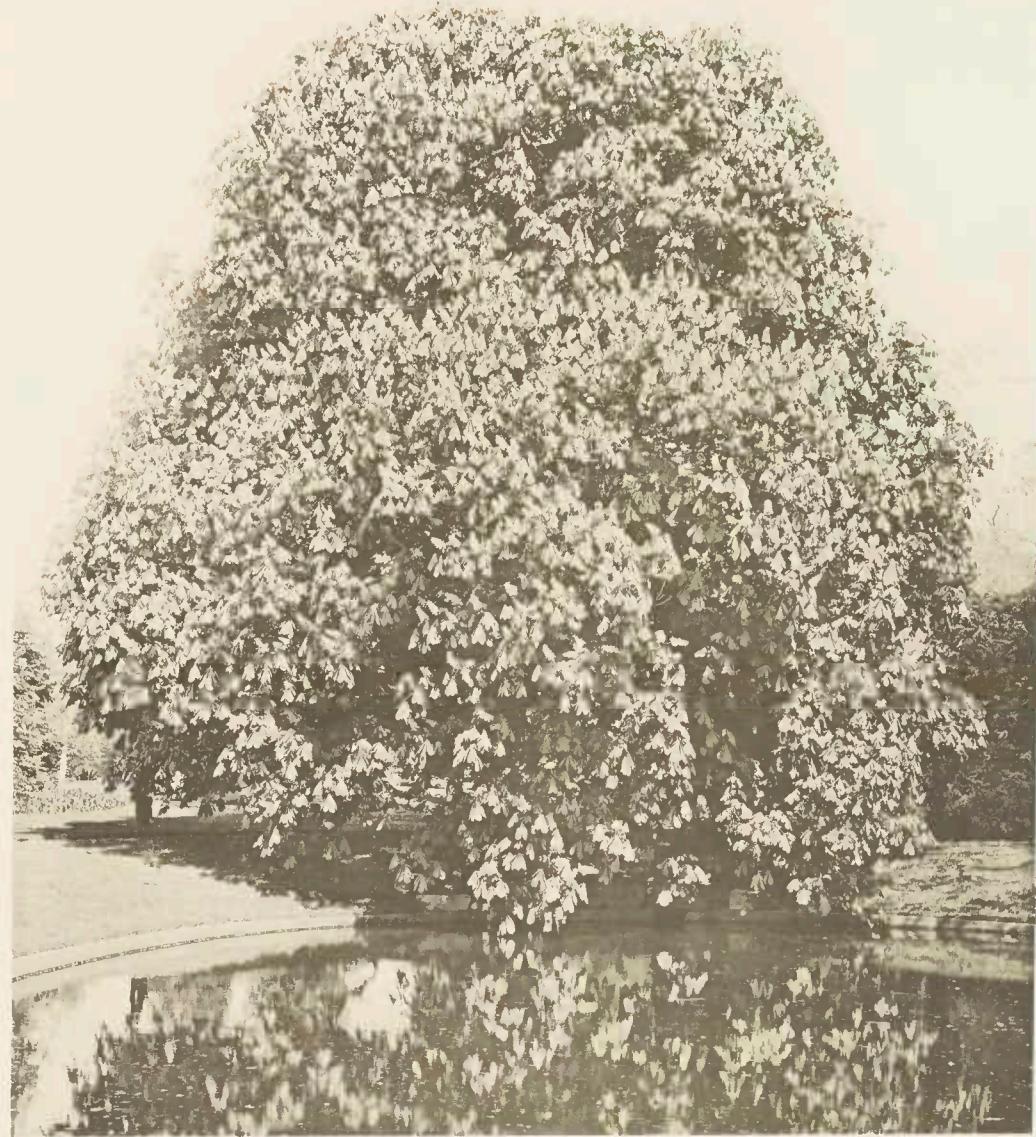
THE BROOKS HORSE-CHESTNUT.

AESCULUS HIPPOCASTANUM, L.

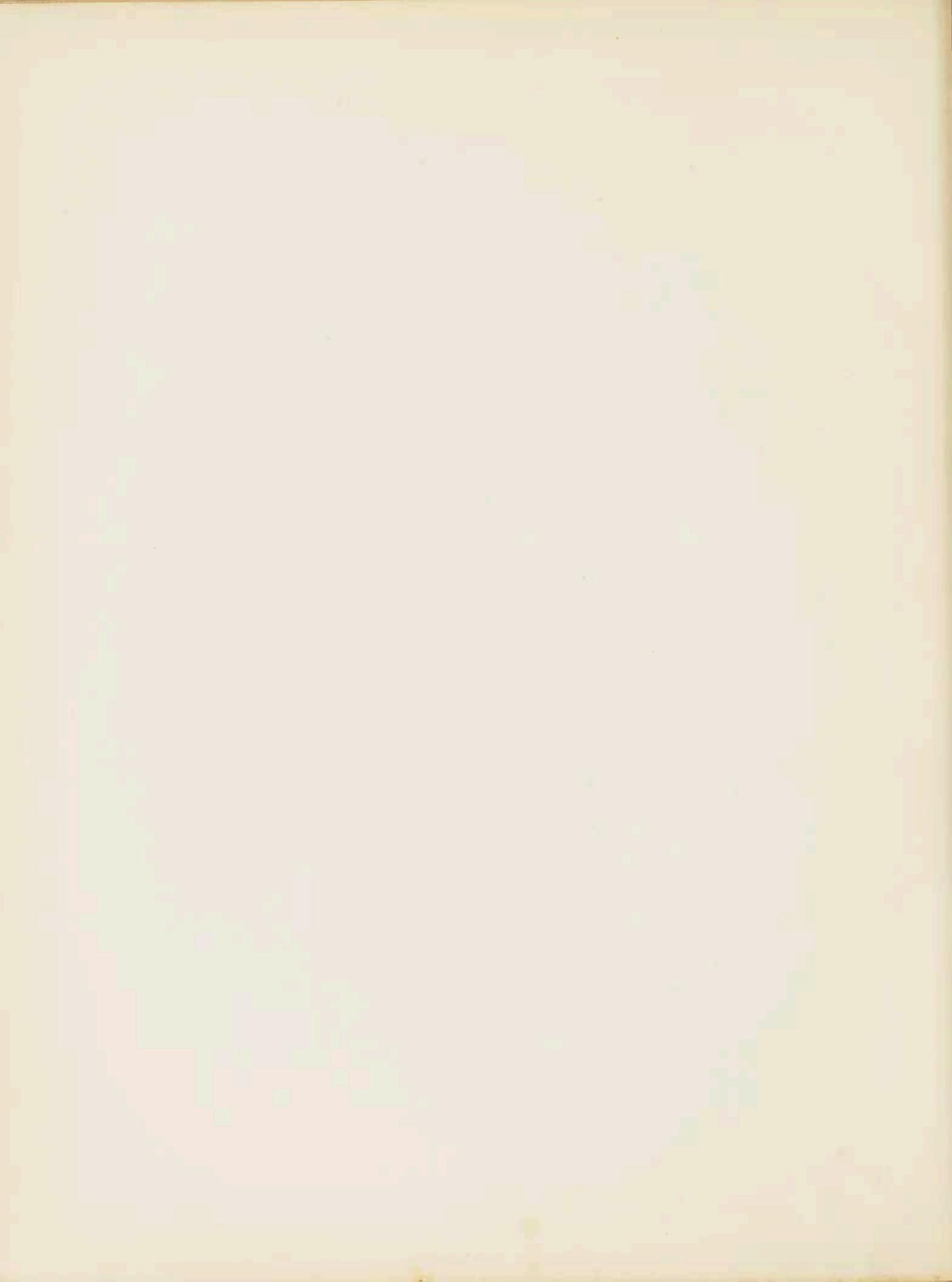
THIS fine tree was set out by Peter C. Brooks in 1810. With the advantages it has had of soil and water, its growth has been rapid. The lower branches slope to the ground, shutting out the base of the tree from view. The great truncated cone of expanded blossoms and unfolding leaves is a beautiful sight in spring.

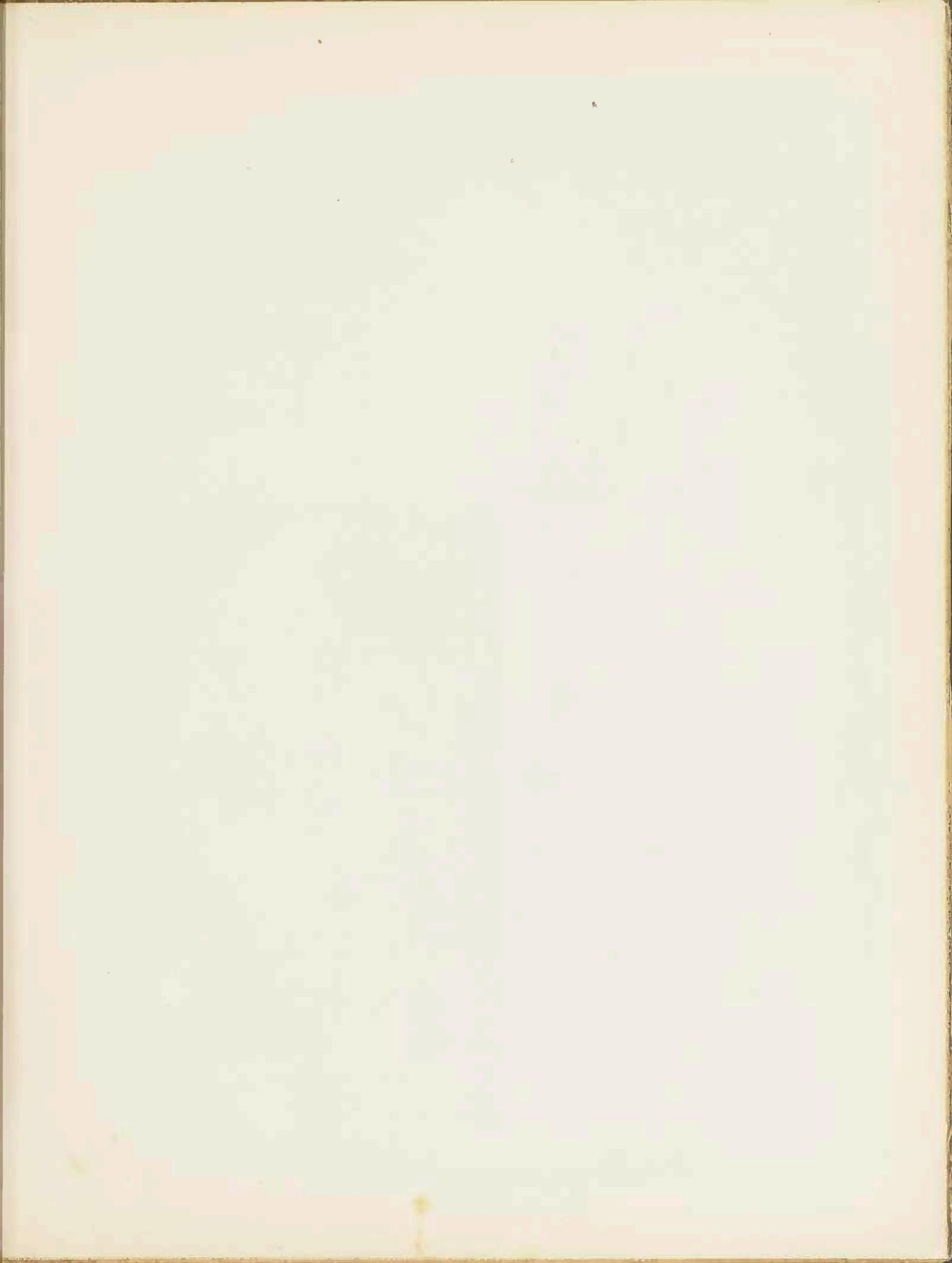
Branches at four feet from ground.	
Girth	" " "
Spread	. . . . .
Height	. . . . .





THE BROOKS HORSE-CHESTNUT, WEST MEDFORD.

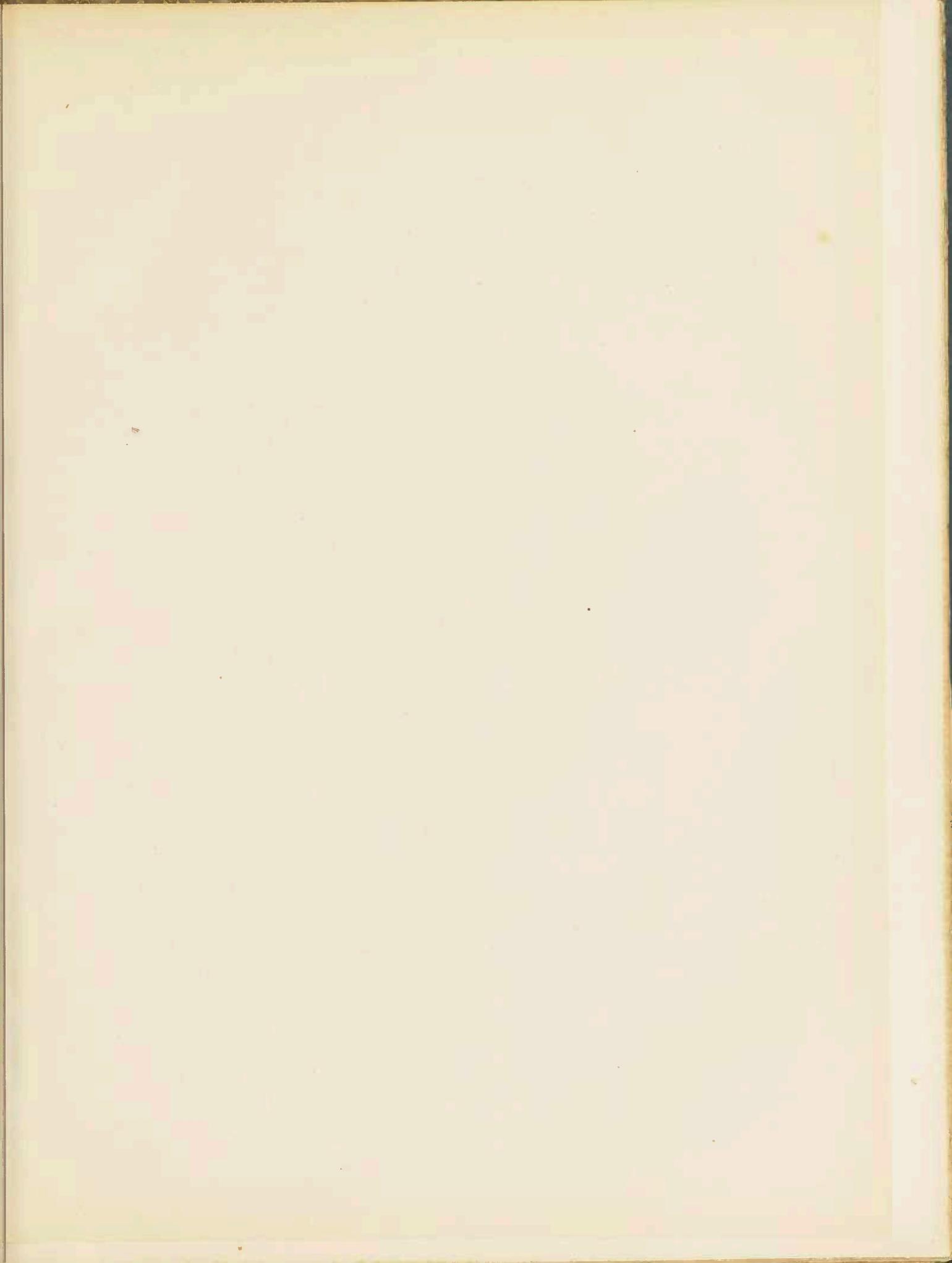




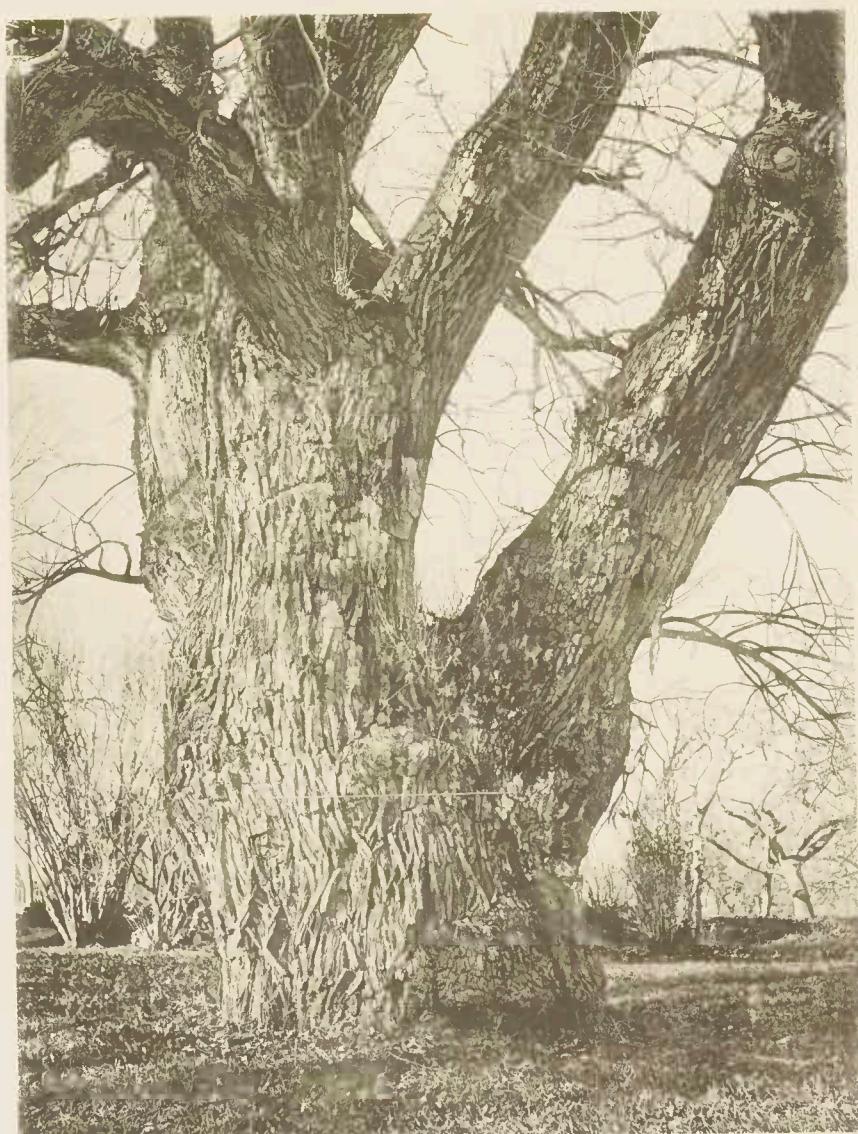
LVII.



THE GROOME WILLOW, DORCHESTER.







THE GROOME WILLOW, DORCHESTER.





THE GROOME WILLOW.

SALIX FRAGILIS, L.

THE Groome Willow stands on the estate of the late Thomas Groome, Humphreys Street, Dorchester, and is probably the largest tree of its species in Massachusetts. At five feet from the ground its girth is 28 feet 2 inches, its height about 60 feet, and greatest expanse 110 feet; but as the enormous branches have lost their extremities, the spread must originally have been ten or fifteen feet more.

Its age rests upon conjecture. The willow, it is true, grows rapidly; but when Mr. Groome purchased the estate, this tree was even then known as the Great Willow.

A D D E N D A.

TREES of great size or historic interest have for the most part been chosen for illustration, preference being given to those that were types of their species and whose ages were known. All the noble trees visited by the authors or reported to them could not be reproduced without far transcending the limits marked out in the prospectus. The measurements of a few of the largest trees not represented are given below, to furnish a basis for further inquiry with regard to rate of growth.

ELMS.

PEARSON ELM, Byfield, not far from Byfield station. Measurements by Mrs. C. N. S. Horner.

Girth at 2 feet from ground	29 feet.
" " 6 " "	19 "
" " 12 " "	29 "

Height 80 feet; spread 106 feet.

CLARK ELM, Franklin Street, Holbrook; nearly in front of residence of Daniel H. Clark. Said to have been set out in 1796. At 5 feet from ground, 1889, its girth is 17 feet 5 inches; forks at 10 feet; greatest spread 110 feet.

BERTRAM ELM, premises of City Library, Salem, 1889. At 5 feet from ground, 14 feet 4 inches.

ELM at corner of the old Taunton road and of Atherton Street, Milton. (Edward W. Forbes.) Girth at 5 feet from ground 15 feet 5 inches.

GREAT ELM standing in front of a grammar-school in Springfield. Girth at 5 feet from ground in 1888 (Mrs. Maria L. Owen), 17 feet 2 inches. This is the tree Emerson mentions as "a few rods north of the hotel." Of all the Springfield elms recorded in his book, this is said to be the only one left.

WASHINGTON ELM, Palmer. At 5 feet from the ground the diameter is 5 feet; the spread is 110 feet. (W. H. Stowe.)

AMMIDOWN ELM, Elm Street, Southbridge. A fine and well-preserved tree, said to have been planted 120 years ago. Girth at 5 feet, 14 feet 1 inch; spread about 75 feet; height about 80 feet. (Dr. C. H. Leonard.)

HALE ELM, Boxford. Forks at 15 feet from the ground; girth at 5 feet, 13 feet 5 inches; spread 104 feet. A fine example of weeping-willow type.

BUCKINGHAM ELM, Heard's Island, Wayland. Girth at 5 feet, 17 feet 5 inches. The tree in this locality mentioned by Emerson is now a mere wreck.

BIG ELM, Framingham, near house of Nathan Gates. Said to have been planted in 1775. Forks at about 4 feet from the ground; girth (1885) just below point of furcation, 22 feet; girth of easterly limb where it leaves trunk, 15 feet 2 inches; of westerly, 12 feet 9 inches; north and south expansion of foliage, 138 feet.

CHESTNUTS.

There is a noteworthy group of chestnuts on the Johnson place, Wayland. They are picturesque wrecks of once fine trees, scattered over an acre lot. The three largest measure respectively at 5 feet from ground, 13 feet 7 inches; 14 feet 10 inches; 17 feet 9 inches. A "double" tree, still vigorous, stands in a neighboring lane. It forks at 5 feet, one branch measuring 10 feet 4 inches, and the other 13 feet 2 inches; girth of trunk at 4 feet, 19 feet 7 inches.

CHESTNUT, Green Lane, Stoneham. In 1882 the girth at 5 feet was 18 feet 8 inches; spread 85 feet, height 65 feet.

There is a chestnut grove, said to have been planted 95 years ago, on land of G. A. Peabody, Danvers. Seven of these, apparently the largest, measure respectively at 5 feet from ground 7 feet 9 inches; 8 feet 6 inches; 7 feet 8 inches; 7 feet 9 inches; 8 feet 7 inches; 7 feet 10 inches; 8 feet $10\frac{1}{2}$ inches.

ASHES.

WHITE ASH, Bedford, in front of residence of Mr. Huckings. 1889. Girth at 5 feet, 13 feet 4 inches.

WHITE ASH, South Billerica, on premises of F. W. Crosby; badly damaged by ice-storm in 1885. Girth at 5 feet, 15 feet $9\frac{3}{4}$ inches.

WHITE ASH, Brush Hill, Milton. Girth at 7 feet, 14 feet. (John W. Dewey.)

BUTTONWOOD.

BUTTONWOOD, West Boxford. Tradition says it was planted by Rev. John Cushing about 1728. At 1 foot from ground its girth is 19 feet 10 inches. (Mrs. C. N. S. Horner.)

OAKS.

SWAMP WHITE OAK, Lyman estate, Waltham. Girth, 1889, at 5 feet from ground, 15 feet 5 inches.

BEECHES.

These trees stand upon the island of Naushon. Measurements by Edward W. Forbes, at about 5 feet except where the tree divides before it reaches that height. No. 1, 13 feet 6 inches just below furcation; No. 2, 12 feet $2\frac{1}{2}$ inches; No. 3, 10 feet 9 inches; No. 4, 10 feet 2 inches.

HEMLOCK.

A tree in Boxford, east of Bald Hill. At 5 feet it measures 9 feet 5 inches in girth.

ROCK-MAPLES.

There is a large ROCK-MAPLE about three miles from Greenfield, on left side of the road to Sheldon, on the top of a long hill. At 5 feet from ground its girth is 14 feet 4 inches; spread 98 feet.

George Sheldon has made a very valuable contribution of measurements and ages of rock-maples planted in the streets of Deerfield.

1802. A row of four, south to north, 8 feet, 9 feet 2 inches, 8 feet 6 inches, 8 feet 8 inches.

1809. A row of five, 7 feet 4 inches, 7 feet $6\frac{1}{2}$ inches, 7 feet 4 inches, 6 feet $10\frac{1}{2}$ inches, 5 feet 11 inches; the last two are shaded by the Willard Elm.

1809. A row of four, beginning with the southernmost, 10 feet $2\frac{1}{2}$ inches, 9 feet 7 inches, 7 feet $6\frac{1}{2}$ inches, 9 feet 4 inches.

1809. A row of six, beginning with southernmost, 9 feet 11 inches, 9 feet $5\frac{1}{2}$ inches, 7 feet $4\frac{1}{2}$ inches, 9 feet, 8 feet 10 inches.

1809. Scattered, 8 feet 2 inches, 8 feet 11 inches, 7 feet 10 inches, 7 feet 11 inches. Another location, from north to south, 6 feet 9 inches, 6 feet 5 inches, 8 feet 6 inches.

1825. A row of four, 6 feet 10 inches, 6 feet 2 inches, 5 feet 1 inch, 5 feet 6 inches; the last two under an elm.

1840. A row east to west, 5 feet 8 inches, 6 feet, 4 feet 3 inches, 6 feet 3 inches, 6 feet 4 inches, 5 feet 3 inches, 5 feet $4\frac{1}{2}$ inches, 5 feet 9 inches, 6 feet 1 inch, 5 feet $\frac{1}{4}$ inches, 5 feet 8 inches, 4 feet 10 inches. A row from north to south, 6 feet 3 inches, 4 feet 4 inches, 6 feet 5 inches.

1869. 3 feet 2 inches, 3 feet 2 inches, 3 feet 11 inches, 3 feet $10\frac{1}{2}$ inches, 3 feet 5 inches.





